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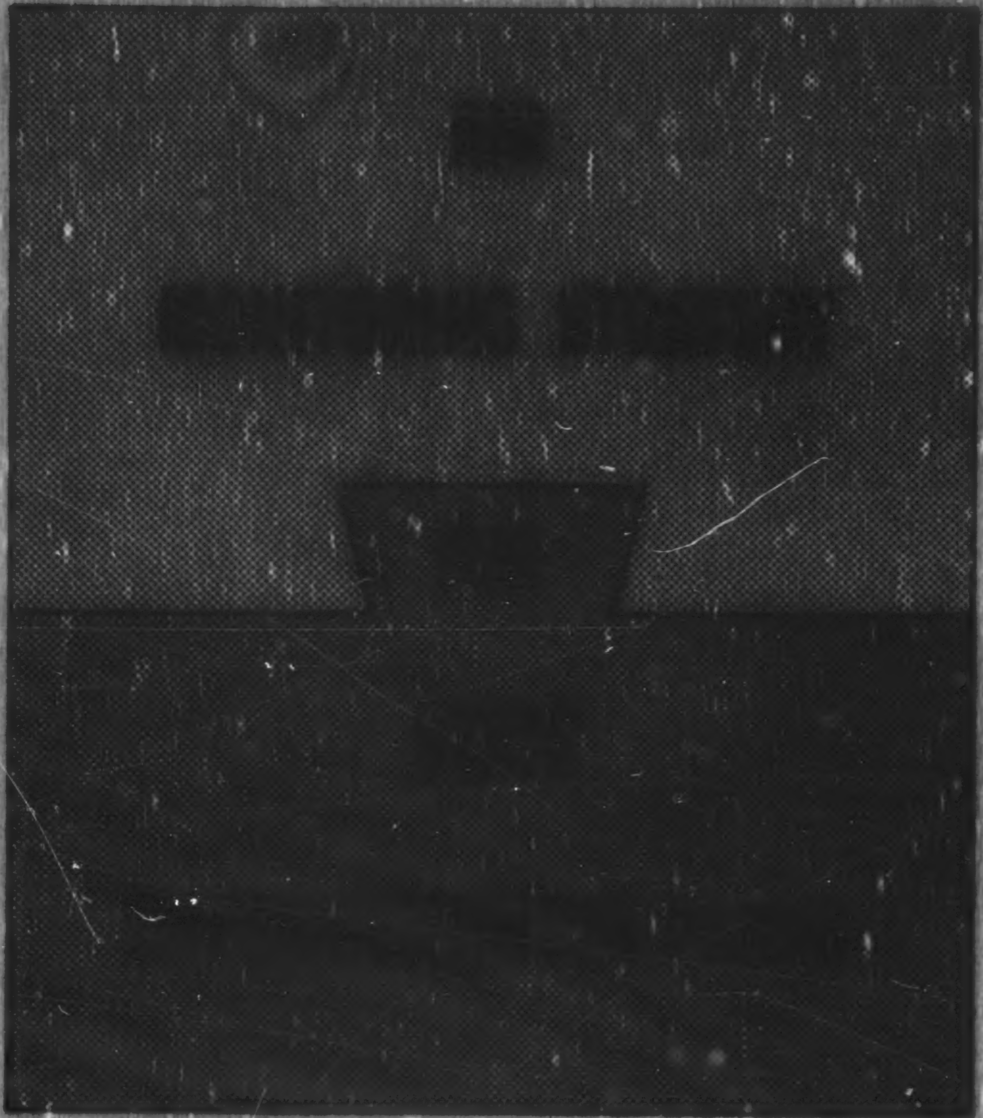

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16. ABSTRACT

This document describes the air monitoring strategy for State implementation plans developed by the Standing Air Monitoring Work Group (SAMWG). It presents a summary of their review and evaluation of current air monitoring activities. A discussion of SAMWG's findings and their resulting air monitoring strategy for State implementation plan monitoring is described.

The major topics discussed in the strategy are: (1) Ambient monitoring, (2) Source monitoring, (3) Future monitoring for non-criteria pollutants, (4) Quality assurance activities for ambient and source monitoring, (5) Analysis and interpretation of air quality information, (6) Anticipated impact of the strategy and (7) Implementation of the strategy.

It was anticipated that the resources associated with air monitoring activites would not change substantially in the near future. Thus the strategy recommends a reallocation of the local monitoring resources so that the overall result will be a more cost-effective monitoring program. A phased implementation approach is also suggested in order to minimize the resource impact of the recommendations in any one year. However, the strategy emphasizes that even with a phased approach, implementation of the recommendations will require more resources, especially for expanded quality assurance programs and the purchase of new instruments to replace obsolete or unacceptable analyzers.

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AIR MONITORING STRATEGY
FOR
STATE IMPLEMENTATION PLANS

Standing Air Monitoring
Work Group

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

June 1977

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

FOREWORD

Concern for the quality of air monitoring data has increased substantially over the past few years and, likewise, so has the response to this concern.

The recommendations of this strategy document were developed through a partnership effort of State, local and Federal air pollution control agencies. They are intended to improve the overall quality of air monitoring data, increase the effectiveness of current monitoring operations, and provide State and local agencies with the flexibility needed to meet their variety of data needs.

This document principally presents overall air monitoring strategy concepts with a minimum of rigid schedules and detailed guidelines. It should be used as the basis for the development of future long-range air monitoring plans. Air monitoring is a dynamic process; measurement methods and techniques change or are improved and, consequently, our monitoring plans will need periodic reevaluation and updating. Hopefully, however, the strategies recommended herein will provide sufficient stabilization to our future monitoring programs thereby enabling us, with minimum disruption to ongoing efforts, to achieve the goal of improved data quality and increased air monitoring effectiveness.

To reach our goal, it is vital that we continue the partnership efforts displayed in developing the strategy described herein.

I request each State and local air pollution control agency to actively and cooperatively participate with this agency in the development and implementation of improved air monitoring plans based upon the overall concepts outlined in this report.

Despite the difficulties of the tasks ahead, through your combined actions, our air monitoring programs, as well as our total air pollution control efforts, will indeed be successful.

Douglas M. Costle

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This report was prepared through the efforts of many individuals: representatives of State and local air pollution control agencies and their respective organizations, as well as spokesmen for the Environmental Protection Agency's headquarters and regional offices. The principal contributors are listed below:

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LIST OF ABBREVIATIONS

AAQS	Ambient Air Quality Standards
A&HM	Air and Hazardous Materials (element of EPA Regional Offices)
AQCR	Air Quality Control Region
AQDHS	Air Quality Data Handling System
CAA	Clean Air Act
CDHS	Comprehensive Data Handling System
CDS	Compliance Data System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DSSE	Division of Stationary Source Enforcement (EPA HQ element)
EIS	Emissions Inventory System
ESECA	Energy Supply and Environmental Coordination Act of 1974
FEA	Federal Energy Administration
FMVCP	Federal Motor Vehicle Control Program
FOI	Freedom of Information (legislation, request, etc.)
FSM	Fixed Station Monitoring
FY	Fiscal Year
HATREMS	Hazardous and Trace Substance Emissions System
HC	Hydrocarbons
HDV	Heavy Duty Vehicle
ID	Identification
LDV	Light Duty Vehicle
NAAQS	National Ambient Air Quality Standard(s)

NADB	National Air Data Branch, National Aerometric Data Bank
NAQTS	National Air Quality Trend Station(s)
NASN	National Aerometric Surveillance Network
NEDS	National Emission Data System
NEDSXREF	Number providing cross reference between NEDS and enforcement data systems
NEPA	National Environmental Policy Act of 1969
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NMHC	Non-Methane Hydrocarbons
NMOC	Non-Methane Organic Materials
NO_2	Nitrogen Dioxide
NO	Nitric Oxide
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standards
OAQPS	EPA's Office of Air Quality Planning and Standards
ORD	EPA's Office of Research and Development
O_3	Ozone
PSD	Prevention of Significant Deterioration of Air Quality
PSI	EPA's Pollutant Standards Index
PSM	Point Source Monitoring
QA	Quality Assurance
RAPS	St. Louis Regional Air Pollution Study
RO	EPA Regional Office
S&A	Surveillance and Analysis (element of RO)

SAMWG	Standing Air Monitoring Work Group
SAROAD	Storage and Retrieval of Aerometric Data (EPA's ambient air quality data system)
SCS	Supplemental Control System
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station(s)
SMSA	Standard Metropolitan Statistical Area
SO_2	Sulfur Dioxide
SPM	Special Purpose Monitoring
TCP	Transportation Control Plans
TSP	Total Suspended Particulate
VMT	Vehicle Miles Traveled

CHAPTER I

EXECUTIVE SUMMARY

ORIGIN AND GOALS OF STUDY

In October 1975, at the request of the Deputy Administrator of the Environmental Protection Agency (EPA), Mr. John Quarles, a Standing Air Monitoring Work Group (SAMWG) was established. The Work Group was to critically review and evaluate current air monitoring activities and to develop, for consideration by control agency management, air monitoring strategies which would help to correct identified problems, improve overall current operations, and adequately meet projected five-year air monitoring goals. Members of the Work Group represented State and local air pollution control agencies and EPA program, and regional offices. Since the great majority of air monitoring activities are conducted by State and local agencies, their views and opinions were widely sought throughout the study period.

The initial concern of the project was to identify air monitoring data needs and to delineate the problems involved in meeting them. Any recommendations for corrective action were to be tempered by the realization that current monitoring resources were limited and any additional resources in the future were uncertain.

SAMWG developed an outline of the basic activities of a comprehensive air monitoring program and used these as the major themes of discussion in writing a series of nine issue papers (see Appendix B). Throughout the study, heavy emphasis was placed on the importance of quality assurance programs in producing timely data that are complete, precise, accurate, and comparable.

The nine issue papers and accompanying recommendations were extensively circulated for the review of State and local agencies and EPA offices. As a result of the comments and suggestions made by the reviewers of the issue papers and the Work Group's earlier identification of monitoring issues, SAMWG compiled a list of a number of air monitoring activities that needed attention, as well as recommendations for improvement. A summary of these major findings are as follows:

MAJOR FINDINGS

Ambient Criteria Pollutant Networks

- Too few/too many monitors
- Monitor siting deficiencies
- Much data of unknown quality
- Quality control and method deficiencies

Non-Criteria Pollutant Monitoring

- Lack of coordination of monitoring activities.
- Deficiencies in analytical instrumentation and procedures
- Insufficient lead time for developing new methods
- Data of unknown precision and accuracy

Existing State Implementation Plan Ambient Monitoring Regulations

- Inflexible for current State Implementation Plan (SIP) needs
- Monitor siting not addressed

Source Monitoring

- Need for comprehensive inventories
- Need for more point source ambient monitoring by private industry

- Quality control and method deficiencies.

Monitoring Resources

- Receive equitable portion of total abatement and control program resources

Data Reporting

- Much unneeded data to EPA central data bank
- Data not timely or complete
- Deficiencies in specific site information

Data Analysis and Presentation

- Need for more public-oriented information
- Need for more timely reports

From the Work Group's findings and the recommendations of the review group, SAMWG proceeded to prepare a draft of an overall air monitoring strategy for SIP. The major SAMWG recommendations presented in the December 1976 draft of the strategy document are presented below.

SUMMARY OF INITIAL RECOMMENDATIONS

- EPA should expand its efforts to implement a formal and comprehensive quality assurance program. The proportion of monitoring resources used in quality assurance is inadequate (approximately 6 percent) and should be increased over the next 5 years to approximately 10 to 20 percent, depending on the type of monitoring program being implemented.
- EPA should modify existing monitoring regulations (40 CFR 51.17) to provide for:
    a. A carefully planned supplement of State and Local Air Monitoring Stations (SLAMS) whose size and distribution

is largely determined by the needs of Regional Offices, States and local air pollution control agencies;

b. A small but well-defined core of National Air Quality Trend Stations (NAQTS) to minimally meet national needs for trend and SIP evaluations; and

c. A plan for special purpose monitoring (SPM) tailored to augment data from NAQTS and SLAMS.

- EPA should revise existing SIP reporting regulations (40 CFR 51.7) to reflect the diminished need for large quantities of data at the national level.
- EPA should provide updated guidance to State and local air pollution control agencies for the collection of the source emission inventory information needed for State Implementation Plan activities, national strategy development and assessment, national trend analysis, and area-specific diffusion modeling.
- EPA should determine the feasibility of establishing a national clearinghouse of monitoring information. The clearinghouse would provide a source of information about air monitoring activities undertaken or authorized by governmental agencies; it would not maintain actual measurement data. It would, however, contain information about the nature and scope of particular monitoring activities so that users could obtain additional information or data, as necessary, from the appropriate agency.
- State and local agencies should complete baseline emission inventories for all appropriate criteria pollutants with priorities determined by the severity of the specific problem in each county. Point source inventories should include all

sources that have a potential for emitting 100+ T/year of a criteria pollutant.

- Each action designed to improve the monitoring program which will cause significant shifts in resources should be phased in over a period of time sufficient to avoid disruption of the agency's program.
- EPA should take steps to establish a clear division of responsibility among its program and research offices for the establishment and conduct of non-criteria pollutant monitoring. A program should be developed to provide for baseline investigations of non-criteria pollutants and for anticipatory non-criteria pollutant monitoring research and development.
- Individual users of data handling systems should develop plans to modify them if their needs are distinctly different from, or exceed, the capabilities of NEDS/SAROAD and related systems. EPA should plan to provide a limited amount of technical assistance to users in evaluating, modifying, or developing new data handling and software systems, and seek to assure overall system compatibility.
- EPA should foster the standardization and use of statistical and simulation modeling techniques required to support the air program activites of EPA regional offices and State and local air pollution control agencies.

The December draft strategy document was then extensively circulated for review by 50 State and some 180 local agencies and EPA offices. In January 1977, four workshops were also held in order to provide agencies the opportunity for first-hand open discussions of the overall concepts of the strategy, as well as of the specific details of the various monitoring program elements. Over 130 persons attended the workshops and approximately 50 persons sent in written comments and suggestions.

There was general agreement with the overall concepts and approach of the proposed air monitoring strategy. In several instances where disagreements did occur, they were found to be the result of the need for additional detail and further clarification of the specific concept in question. A summary of the more frequent and major comments follows.

SUMMARY OF COMMENTS ON INITIAL STRATEGY DOCUMENT

- Reviewers unanimously agreed that good quality data is absolutely necessary. They added, however, that additional resources would be required to fully implement the recommended minimum quality assurance program.
- Several reviewers stated that all SIP monitoring activities should have a minimum quality assurance program rather than treating it as a necessity for National Air Quality Trend Stations (NAQTS) and a somewhat lower priority for State and Local Air Monitoring Stations (SLAMS) and Special Purpose Monitoring (SPM).
- A large number of reviewers stated that the definition of potential and actual source emissions needs clarification.
- A majority of the workshop participants rejected the proposed concept of only reporting baseline emission inventory data to EPA. However, they emphasized that a reporting time of more than 90 days after the end of the calendar year was necessary in order to provide a more comprehensive annual emissions inventory data report.

- Reviewers agreed with the concepts of non-criteria pollutant monitoring; however, they stressed that EPA should look to the States for more input to this important monitoring area.
- The reviewers felt that the strategy gives the impression that a general across-the-board reduction in monitoring activities and/or resources was recommended. In addition, they felt the strategy implied that the NAQTS were first priority and the SLAMS were lower priority and second-class stations.
- Many of the workshop participants felt that submission of one-half of the filters from the NAQTS total suspended particulate (TSP) sites was not acceptable. States having the capability to do the filter analyses for non-criteria pollutants and using acceptable quality assurance practices should be allowed to do the analyses and merely submit the data to EPA.
- A number of the reviewers disagreed with SAMWG's recommendation of having CO street canyon sites included as a NAQTS site. They suggested that this type of monitoring is more appropriately classified as SPM or SLAMS monitoring.
- A majority of the participants emphasized that siting criteria should be handled as a formal guidance document rather than a Federal regulation.
- Several reviewers suggested that SAMWG should modify the recommendation "that point sources not be required to routinely establish permanent full-scale point source ambient monitoring (PSAM) programs." They felt that this should be an option of the State, local agency, or EPA regional office.

- There was general agreement with the overall goal of implementing the strategy over a five-year period. However, there were serious concerns that some States could not implement the entire strategy in five years due to resource limitations. They stressed the need for more flexible goals that will allow negotiations within the 105 Grant procedures that will produce a realistic and effective long-range monitoring plan.
- A number of regional offices suggested that it was important to emphasize that the Regions would need more State and local data than EPA headquarters.

Extensive discussions were held and serious consideration was given to the comments and suggestions offered by the reviewers and workshop participants. Where feasible, appropriate changes were incorporated into the overall body of the document, the detailed recommendations in the various chapters, and the revised summary of recommendations in this chapter. The revised summary of recommendations is as follows:

SUMMARY OF REVISED RECOMMENDATIONS

- Efforts should be expanded to implement a formal and comprehensive quality assurance program. The proportion of monitoring resources used in quality assurance is inadequate (approximately 6 percent) and should be increased over the next five years to approximately 10 to 20 percent, depending on the type of monitoring program being implemented. Initiation of the quality assurance program may require as much as 25 percent of the monitoring resources. However, once implemented, a resource reduction should occur. All monitoring activities which are relatable to SIP's should be under a quality assurance program.

- EPA should modify existing monitoring regulations (40 CFR 51.17) to provide for:

  a. A carefully planned network of State and Local Air Monitoring Stations (SLAMS) whose size and distribution is largely determined by the needs of State and local air pollution control agencies in meeting their respective SIP requirements.

  b. A small but well-defined core of National Air Quality Trend Stations (NAQTS) to minimally meet national needs for trend and SIP evaluations. These stations essentially would be a subset of existing SIP/SLAMS monitoring networks.

  c. A plan for Special Purpose Monitoring (SPM) tailored to augment data from NAQTS and SLAMS.

- EPA should revise existing SIP reporting regulations, both ambient and source (40 CFR 51.7), to reflect changes in the reporting of source inventory and ambient data to EPA central data banks. Data gathered from NAQTS should be received in EPA headquarters within 90 days of the end of a calendar quarter. EPA regional offices should negotiate with State and local air pollution control agencies regarding the format, frequency, and timeliness of data required from SLAMS and on an optimum handling procedure for NAQTS data. Regional offices storing SLAMS data in machine readable form must be made through the appropriate regional office. An inventory of SLAMS must be provided to EPA on an annual basis. EPA should consider some form of technical assistance to State/local agencies with their own data handling systems to assure adequate performance of data submittal requirements. Control agencies should submit to EPA updated comprehensive emission inventories annually instead of the current semiannual submissions. As a minimum, the year of record should be updated. The inventories should continue to include criteria pollutants point source actual emissions. The area sources should also continue to be reported on at the county level for those areas where NAAQS are either violated or threatened. As additional air quality standards are promulgated, the emission reporting level for each new pollutant should also be specified. Data should be submitted to EPA, in the NEDS fixed format machine readable form, within 180 days after the end of a calendar year. Data may be submitted more frequently as they become available.

- EPA should provide updated guidance to State and local air pollution control agencies for the collection of the source emission inventory information needed for SIP activities, national strategy development and assessment, national trend analysis, and area-specific diffusion modeling.
- EPA should determine the feasibility of establishing a national clearinghouse of monitoring information. The clearinghouse would provide a source of information about air monitoring activities undertaken or authorized by governmental agencies; it would not maintain actual measurement data. It would, however, contain information about the nature and scope of particular monitoring activities so that users could obtain additional information of data, as necessary, from the appropriate agency.

- Each action designated to improve the monitoring program which will cause significant shifts in resources should be phased in as resources become available or can be redirected.
- The resources to initiate the monitoring strategy should come to the extent possible from a reallocation and more efficient use of currently available resources. SAMWG believes that the monitoring strategy is a minimally adequate program for SIP data needs. However, it is also felt that in order to implement the SIP monitoring strategy, additional resources will be needed and should be provided to control agencies.
- EPA should take steps to establish a clear division of responsibility among its program and research offices for the establishment and conduct of non-criteria pollutant monitoring. EPA should seek significant State and local agency input to the activity of non-criteria pollutant monitoring. A program should be developed to provide for baseline investigations of non-criteria pollutants and for anticipatory non-criteria pollutant monitoring research and development.
- Individual users of data handling systems should develop plans to modify them if their needs are distinctly different from, or exceed, the capabilities of NEDS/SAROAD and related systems. However, the NEDS/SAROAD coding and file format should be the basis for such systems. EPA should plan to provide a limited amount of technical assistance to users in evaluating, modifying, or developing new data handling and software systems, and seek to assure overall system compatibility.

- EPA should foster the standardization and use of statistical and simulation modeling techniques required to support the air program activities of EPA regional offices and State and local air pollution control agencies.

IMPLICATIONS FOR RESOURCES AND PLANNING

The finding that air monitoring activities related to SIP's generally have an equitable portion of the total abatement and control program resources, led SAMWG's thinking toward a reallocation of the total resources available for monitoring so that they would be used more effectively. Since substantial additional resources are not generally expected to be available in any one year, SAMWG developed a minimally adequate program to be phased in over a period of time. The phased approach was taken to minimize the resource impact of the recommendations in any one year. Even with this approach, SAMWG finds that implementation of the strategy will require more resources, especially for expanded quality assurance programs and the purchase of new instruments to replace obsolete or unacceptable analyzers.

In order to provide some overall guidance and structure for the implementation of this strategy, SAMWG suggests that EPA's Annual Program Guidance documents be used to specify the objectives to be stressed during the next and future fiscal years. This annual guidance will include strategy objectives for both EPA regional offices and headquarters components, as well as State and local programs. The Annual Program Guidance should continue to have input from SAMWG or its successor. This group should have increased State and local agency participation. In preparing their annual program plans, all EPA offices are expected to commit themselves to accomplishment of as many of these desired objectives as are possible within their resources. Necessarily, many of the regional office air monitoring objectives will require action by State and/or local agencies. For FY-1978, SAMWG has recommended that the Regional Offices work closely with their respective States to prepare plans and schedules for the implementation of SAMWG's major recommendations. This approach was proposed at the workshops held in January, 1977 as a means of ensuring that implementation was closely tailored to the individual needs and resources of each agency. To allow State and local agencies the latitude implied by this approach, SAMWG has revised Chapter IX to reduce the number of items to be implemented under a uniform schedule. Implementation of the minimum quality assurance program, however, remains a firm requirement for the first year. The regional offices are also expected to have an active role in assisting control agencies in program evaluation and providing technical assistance in new, specialized or problem areas of air monitoring. In some cases, the EPA regional offices may choose to incorporate some portion of these objectives as outputs expected under an agency's 105 Grant Program.

Resource constraints must be carefully considered along with the fact that State and local agencies will have changing needs for monitoring information over the next five years. Also, it is likely that the state-of-the-art in air monitoring will advance during the five-year period. For these reasons, implementation will be closely coordinated through the Annual Program Guidance and through periodic re-evaluations which will consider air monitoring within the overall context of the Air Program. As a result, this strategy document contains a minimum of rigid schedules and should not be viewed as a set of static requirements for judging progress.

CHAPTER II

INTRODUCTION

ORIGIN AND MISSION OF THE STANDING AIR MONITORING WORK GROUP

In September 1975, the Deputy Administrator of the Environmental Protection Agency, Mr. John Quarles, requested that a continuing group be formed to review air monitoring activities and to develop and oversee the implementation of an overall strategy to govern them. More specifically, this body, which was established in October 1975 as the Standing Air Monitoring Work Group (SAMWG), was to (1) determine how much and what kinds of monitoring data were needed to meet the Agency's principal air program goals, (2) ascertain, by a comprehensive review of ambient and source monitoring activities being conducted or fostered by the Agency, the extent to which these needs were being met, and (3) identify major air monitoring issues and present them in decision papers for approval within and outside EPA and for subsequent incorporation in a five-year monitoring strategy. It should be stressed that SAMWG's primary concern with air monitoring was its usefulness as an instrument for supporting air pollution control and abatement efforts and promoting compliance with air quality standards. Air monitoring for research and development programs would be addressed only to a limited extent, mainly in the issue paper on non-criteria pollutants.

It was Mr. Quarles' special concern, in view of the central role played by monitoring in the improvement of air quality, that SAMWG's recommendations for future strategies should evolve from a partnership between EPA and the States, working together to assure that needed air quality data be obtained within the limits of the resources made available by Federal, State and local governments now and in the foreseeable future. In recognition of the fact that the bulk of routine monitoring operations are conducted by State and local control agencies, SAMWG made a firm commitment to obtain their active participation in reviewing and evaluating current air monitoring activities. This was done largely through the series of nine issue papers, which were widely circulated in draft to State and local agencies for their comments. In this way, the Work Group acquired the views of management and decision-making officials on strategies for effective air monitoring as well as the comments on air monitoring specialists on technical matters. These views and comments were incorporated in the final version of the issue papers.

INITIAL TASKS OF THE SAMWG

For the purpose of the Work Group study, it was necessary to clarify the use of the term "air monitoring." In common usage, air monitoring is often synonymous with the operation of a network of ambient monitoring stations at fixed sites. However, the definition of air monitoring used by the Work Group is somewhat broader. As used in the issue papers developed by the Work Group, "air monitoring" refers to activities which are related to establishing the concentration or quantity of a pollutant. These activities are divided into general ambient air monitoring, source emission monitoring and point source ambient monitoring.

Ambient monitoring generally implies the measurement, estimation, or projection of pollutant concentrations in the air.

Source monitoring involves gathering data about the pollutant emissions from specific stationary or mobile sources, either by direct emissions measurement or by estimation on the basis of related factors. The difference between ambient and source monitoring becomes more difficult to recognize when ambient monitoring is conducted near a point source, as, for example, in the placing of SO_2 monitors in the area affected by a large source to ascertain the contribution of the source to local air quality. This activity, which is neither in-stack measurement nor general ambient monitoring, is generally referred to as point source ambient monitoring.

Prior to the establishment of SAMWG, a number of EPA reviews had identified deficiencies in several areas of air monitoring. Some deficiencies resulted from a failure to adapt to rapidly changing data needs. This failure can be explained to some degree by the fact that most planning of air monitoring activities had been concerned with short-range objectives. Among other broad problems identified were the lack of well-defined Agency priorities, the absence of comprehensive quality assurance programs, and the need to restructure the systems used to store and report data so as to meet a variety of data usage needs more satisfactorily. The initial work of SAMWG was thus focused on the identification of present and future air monitoring needs and on the delineation of the problems involved in meeting them.

Identification of Air Monitoring Data Needs

Numerous lists and detailed description of air monitoring data uses have been made. The Work Group prepared an extensive, but not all-inclusive, list of principal uses of air

TABLE II-1. PRINCIPAL USES OF AEROMETRIC DATA BY USE LEVEL *

	USES	EPA HQ	EPA RO	STATE/LOCAL AGENCIES
1.	Judge attainment/non-attainment of TSP NAAQS	1	3	3
2.	Evaluate progress in achieving/maintaining NAAQS or state standards	1	3	3
3.	Develop or revise SIP's to attain/maintain TSP NAAQS	1	3	3
4.	New Source Review and prevention of significant deterioration	1	3	3
5.	Develop or revise national TSP control policies (e.g., NSPS, tall stacks, SCS)	2	N/A	N/A
6.	Model development and validation	3	3	3
7.	Energy Supply and Environmental Coordination Act (ESECA)	1	2	3
8.	Support enforcement actions	2	3	3
9.	Public information (e.g., air quality indices)	1	1	3
10.	Health research/establish standards	3	3	3
11.	Develop or revise local control strategy	1	2	3
12.	Determine specific cause of pollution in an area	1	2	3
13.	Determine nature of air pollution problem in an area	3	3	3

*Use level refers to the detail, extent and frequency of reporting of data needed by the user for the stated purpose.

1. Refers to a low level of detail, extent, and frequency of reporting
2. Refers to a moderate level of detail, extent, & frequency of reporting
3. Refers to a high level of detail, extent, and frequency of reporting

N/A - Not applicable

monitoring by use level. This is given in summary form in Table II-1. A cursory examination of this summary not only suggests the importance of monitoring data for all phases of the air program, but also shows how needs vary according to the functions and responsibilities of the user.

Delineation of Air Monitoring Problems

Considering the broad problems identified above, the variety of current monitoring activities, and the data use list of Table II-1, SAMWG developed an extensive list of issues facing agencies or programs involved in air monitoring activities. The following are examples of the sort of questions which were raised.

- Are current State Implementation Plan (SIP) monitoring networks adequate in terms of the quantity and location of stations established for the purpose of tracking the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS)?
- Can valid national air quality assessments be made with data from a smaller number of monitoring stations than are now reporting to EPA?
- What specific needs for source and emissions data are not being met by current activities?

A compilation of the questions which surfaced during the early stages of the SAMWG study is included in Appendix A. These questions were categorized under the broad topics listed below.

- Quality Assurance Programs
- Adequacy of SIP Ambient Monitoring Networks
- Source and Emission Data
- Air Quality Reporting

- Monitoring Non-Criteria Pollutants
- Point Source Monitoring
- Data Processing and Support Systems
- Use of Air Quality Models

SAMWG APPROACH TO MONITORING PROBLEMS

The approach taken by the Work Group in reviewing monitoring issues involved several distinct phases. (1) First, priorities were assigned to the data needs of control and abatement programs. (2) Then, a hypothetical monitoring system was devised which would efficiently produce the data required. In this exercise, an effort was made to determine the best balance of ambient monitoring, source data collection, and modeling. (3) Next, SAMWG attempted to identify problems and deficiencies of existing monitoring systems in meeting data requirements. (4) Finally, recommendations on immediate corrective actions and several long-term directions were made for consideration by officials responsible for monitoring systems design and management. Throughout the Work Group's deliberations, the need to maximize potential benefits from existing limited resources was of paramount concern.

Activities of a Basic Monitoring Program

In connection with the second phase of the approach just described, the Work Group developed a basic outline of the elements of an adequate air monitoring program. These were used as major points of discussion in writing the issue papers discussed below.

Monitoring Program Activities

- Ambient Monitoring
  - State and Local Ambient Monitoring Stations (SLAMS)

  - National Air Quality Trend Station (NAQTS)
  - Special Project Monitoring (SPM)
  - Diffusion Modeling
- Source Monitoring
  - Emission Inventories
  - Continuous Source Emission Monitoring
  - Manual Source Testing
  - Source Operation Parameter Monitoring

These basic activities are treated in some detail in the succeeding portions of this document.

SAMWG Issue Papers

Because of the scientific and technical nature of air monitoring, the Work Group believed critical reviews and evaluations of such monitoring programs would be best conducted through discussions covering one pollutant or special topic at a time. Important but strictly technical details such as instrumentation and chemistry were not dealt with in any depth by SAMWG. Rather, basic operational and program parameters were emphasized. As a result, SAMWG developed a series of issue papers on general considerations of air monitoring. A complete list of the issue papers developed is provided below. Copies of these are available in final form from SAMWG.

- Tape Sampler Monitoring Networks
- Background And General Considerations In The Development Of Strategy Issues For Improvement In Air Monitoring
- Strategies For Improved SO_2 Monitoring

- Strategies For Improved Oxidant And Hydrocarbon Monitoring
- Strategies For Improved Suspended Particulate Monitoring
- Strategies For Point Source Monitoring
- Strategy For Improved NO_2 Monitoring
- Strategies For Improved CO Monitoring
- Strategy Issues For Non-Criteria Pollutant Monitoring

The importance of producing timely data that are complete, precise, accurate and comparable was well recognized by SAMWG. As a result, implementation of quality assurance programs was stressed, and reference to minimum quality assurance requirements was repeated and emphasized in each appropriate issue paper.

ISSUE PAPER RECOMMENDATIONS AND AIR MONITORING STRATEGY DOCUMENT

All of the issues discussed by SAMWG in the various issue papers generated one or more recommendations for improvement. (A summary of these issues and the respective recommendations is given in Appendix B.) The major recommendations and conclusions of the issue papers form the substance of the overall air monitoring strategy proposed in the present document.

The Work Group's major objective was to develop an air monitoring strategy that would provide the greatest possible benefit from the resources devoted to air monitoring programs. It was assumed that these resources would remain essentially constant. Therefore, control agency efforts to implement the document's recommendations may in some cases require a redirection of agency monitoring activities. To do this effectively, the relative importance of various data needs will have to be carefully established.

A summary of the major recommendations of SAMWG may be found at the end of each chapter. They place major emphasis on the need for greater flexibility at the State level in order to respond to varied special purpose monitoring needs deriving from the general goal of attaining and maintaining ambient air quality standards. Several recommendations involve fixed, rigid requirements such as adherence to the Federal Reference Methods and the establishment of permanent National Air Quality Trend Stations.

Chapters III-VII of the present document discuss in detail the individual elements of the air monitoring strategy, while Chapters VIII and IX deal with its impact and implementation.

USE OF STRATEGY DOCUMENT

As mentioned earlier, the views and comments of State and local control agencies were incorporated in the final version of the issue papers and in the proposed strategy document. SAMWG promoted a further interchange of views by holding a series of workshops on the proposed strategy in January 1977. The final air monitoring strategy document reflects the deliberations of these workshops as well as any additional comments that were received on the proposed strategy document.

The final strategy document should be used to provide a blueprint for the development of comprehensive air monitoring program plans. SAMWG supports the idea that each State should develop a comprehensive monitoring plan which describes the major elements of the program as well as a target schedule for implementation. Such plans should be developed during the early part of FY 1978. It is recognized that resource availability varies considerably from State to State and consequently schedules for implementation will necessarily differ from State to State.

Over the next five years, the Strategy Document will be used as the overall basis for the Annual Program Guidance prepared by EPA. It is SAMWG's intent that the program guidance be used to highlight the monitoring objectives to be stressed for the fiscal year. This Annual Guidance will have to incorporate any changes in national monitoring priorities and reflect the States' monitoring progress and the comprehensive plans and schedules developed by the States. To assist the States in implementing their plans, EPA in cooperation with the States and local agencies will develop appropriate technical assistance and guidance documents called for in the strategy document.

Another additional and important use of the air monitoring strategy document is to provide the basis for proposing and promulgating changes in the Agency's regulations governing SIP reports (40 CFR 51.7) and air quality surveillance systems (40 CFR 51.17).

CHAPTER III

AMBIENT AIR MONITORING PROGRAM

INTRODUCTION

In the regulations (40 CFR Part 51) EPA wrote to guide the preparation of acceptable State Implementation Plans (SIP's), the Agency specified that the States would develop and operate an ambient air monitoring program as an integral part of their effort to attain and maintain the national ambient air quality standards (NAAQS). The size of the States' ambient monitoring networks was related to the pollutant priority classification and total population of an air quality control region. In addition, the regulations (40 CFR 51.17) required that the area of maximum pollutant concentration be monitored.

As of this date, most States have developed networks that are at least as large as the minimum size specified by EPA. In fact, most states have developed and operate networks that somewhat exceed the prescribed minimum. In cases where States notified EPA of their intention to operate larger networks than required by the regulations, EPA approved such networks as part of the SIP's and continues to support the "additional monitoring" through the grants mechanism. Thus, many approved networks that are larger than legally required are partially maintained by Federal funds.

By and large, the networks that are operated by the States provide the bulk of the information needed by the States and EPA to evaluate the progress being made in the effort to attain and maintain the NAAQS. EPA prepares reports and evaluations on the basis of these data to support the development of plan revisions where needed, and to provide national overviews of the status of air quality. The regions provide day-to-day assessment of the adequacy of State monitoring systems to meet their need to evaluate specific SIP's and to develop any air quality attainment/maintenance plans that may be needed.

It is recognized that the needs for, and uses of, ambient data are dynamic. Accordingly, SAMWG's review of the ambient monitoring program focused first on the needs for ambient data (see Chapter II). These needs were then compared with current and projected capabilities to determine if any serious deficiencies were apparent.

This review showed that the ambient program is basically effective in providing information for support of State implementation plan activities. Nevertheless, SAMWG identified several areas where the correction of existing deficiencies would result in a more efficient use of ambient monitoring resources at all levels. The deficiencies were discussed in great detail in each of the issue papers dealing with criteria pollutant monitoring. The principal ones are summarized below to provide a perspective for the program changes which should be implemented over the next five years.

Redundant/Unneeded Data

In some cases, more stations are in operation than are absolutely necessary for the purpose of documenting general ambient conditions and trends. In some areas, especially those where ambient levels are well within acceptable limits, stations could be terminated or relocated to other areas where ambient problems are more acute. At the EPA headquarters level, routine overviews of national air quality and trends can be adequately evaluated with data from a relatively small subset of stations routinely operated by State and local air pollution control agencies.

Monitoring Inflexibility

Existing regulations do not allow State and local agencies sufficient flexibility in conducting monitoring to meet current data needs related to SIP review and revisions. In many instances, resources needed to conduct special purpose monitoring studies in support of SIP's are "tied up" in operation of monitors which, although required by regulation, now provide only marginally useful information.

Timeliness and Completeness of Data

The diversity of data needs, coupled with overall monitoring resource constraints, has often resulted in information which is untimely or incomplete in terms of its intended purpose. This problem is most acute at the national level, where adequate air quality data are often not available for routine trend analysis until 12-18 months after each calendar quarter.

Data Quality

A host of factors related to monitor location and probe siting, sampling methodology, quality assurance practices, and data handling procedures have resulted in data of unknown or questionable quality. Many of these deficiencies will be minimized over the next five years as a formal quality assurance program is adopted and fully implemented by the State and local air pollution control agencies.

FUTURE AMBIENT PROGRAM

SAMWG proposes the elimination of these deficiencies through a careful process of planned improvements in SIP ambient monitoring. As a first step, the existing SIP ambient networks should be thoroughly reviewed by States and regional offices to determine if these networks are capable of supplying the information necessary to support SIP activities. The review should take into consideration the design of the network (number and locations of stations), instrument siting (exposure, distances from locally interfering sources), and the operating characteristics of the monitors (equipment types, quality control, performance audits, etc.). During the review process, deficiencies should be documented. Also, attention should be focused on determining ways in which monitoring resources might be more efficiently used, such as by relocation of monitors or shutdown of stations not providing useful data, etc.

Second, a comprehensive plan should be developed by the States in coordination with the regional offices for upgrading the SIP ambient network. The plan, at a minimum, should provide for three specific ambient monitoring activities. These activities should come to be regarded as the principal types of ambient monitoring conducted by State and local agencies and necessary to fulfill the need for ambient monitoring information at the local, State, regional and national levels. These activities are:

State and Local Air Monitoring Stations (SLAMS)

A carefully planned network of fixed monitoring stations whose size and distribution is largely determined by the needs of Regional Offices, States and local air pollution control agencies in meeting their respective SIP requirements.

National Air Quality Trend Stations (NAQTS)

A small but well-defined core of fixed monitoring stations to minimally meet national needs for trend and SIP evaluations. Initially, these stations will be essentially a subset of existing SIP monitoring networks.

Special Purpose Monitoring

These monitoring activities shall consist of well-defined studies required by the State and local agencies to support SIP's and other air program activities.

The following sections discuss each of the proposed monitoring activities in greater detail.

STATE AND LOCAL AMBIENT MONITORING STATIONS

These stations will be the backbone of the ambient monitoring program relative to SIP activities. They provide local agencies, State agencies, and EPA with long-term air quality data on a routine basis to ensure compliance with NAAQS, to measure air quality trends, to indicate potential ambient problems, to measure background air quality, and to determine transport of air pollutants--all of which remain essential elements in evaluating the effectiveness of the SIP's.

The majority of SLAMS should be located in problem areas to ensure compliance with NAAQS throughout a State with a few sites located to evaluate regional trends, particularly in potential growth areas. Depending on the pollutant, additional background air quality data sites may be needed to determine either remote rural pollution levels or transport of specific pollutants into a region. Data generated by these stations must be sufficient to support ongoing local, State, regional, and national programs.

The following are examples of continuing programs which require long-term air quality data and which should be considered by both the regional offices and the States in planning and establishing SLAMS networks. If possible, the data should be usable by more than one program. Each of these programs have elements unique to a particular regional office or air pollution control agency and thus the size and nature of the SLAMS networks will vary from area to area. Suggested monitoring objectives relative to abatement and control programs are:

Evaluation of Potential Non-Attainment Areas

Sites should be located in maximum pollution areas with reasonable population exposure. While not every area with the potential for violating NAAQS must be monitored, certainly the areas with the highest potential should be monitored, including those areas in proximity to major sources of total suspended particulate (TSP) and sulfur dioxide (SO_2).

Maintenance Plans

Long-term data needs for this activity would be associated with areas of rapid growth or changing emission patterns. There may also be a need to develop long-term data showing transport of a specific pollutant into a region. Once maintenance plans are adopted, data will be needed to assess the effectiveness of the control strategies.

Oxidant and Carbon Monoxide Control Strategies

Data needs will primarily involve a determination of the effectiveness of control strategies and the need for additional control measures. Long-term data needs may also involve residential, neighborhood and regional impact and trends.

Non-Deterioration Areas

There may be data needs in relatively clean areas which are expected to experience significant growth. Future considerations may require data from areas in economic decline to assess the possibility of introducing new growth. Periodic monitoring appropriate to the situation is recommended.

Emergency Episodes

Data will be required in areas which have significant emissions and are prone to air stagnations.

Evaluate Existing SIP Control Strategies

Data will be required to evaluate the effectiveness of existing control strategies, so that they may be retained, tightened, or relaxed on a sound basis.

The entire SLAMS network should be reviewed annually and if necessary, revised. Each site should be re-evaluated to determine if it is still providing useful long-term air quality data for current programs. Unneccessary stations should be eliminated or relocated. The review shall include quality assurance procedures, methodology, equipment, instrument siting and data handling. Modifications to SIP SLAMS must not be made without the concurrence of the EPA regional office.

This network must meet specific requirements to insure quality data.

1. Each site must meet approved EPA siting guidelines for instrument exposure and sample inlet design.

2. Written quality assurance procedures must be developed for each pollutant based on EPA guidance. (See chapter on quality assurance.)

3. All sampling methods and equipment must meet the requirements of 40 CFR, Parts 50 and 53 (e.g., non-FRM and non-equivalent instruments cannot be used after February 1980).

4. Acceptable data validation and record-keeping procedures must be followed.

The number of SLAMS making up an adequate ambient network cannot be realistically specified according to any set of national criteria. In most cases, however, it is likely that several times as many SLAMS as NAQTS will be needed to adequately represent the air quality of any particular area. The actual size of SLAMS networks must be carefully evaluated and negotiated between the affected agency and the EPA regional office. Existing guidance, coupled with the combined experience of the monitoring agencies are required to plan and implement necessary changes in existing SIP monitoring networks. In some situations, this may be accomplished through minor adjustments to the existing networks; in other situations, a major revision may be called for.

The monitoring data obtained from SLAMS should be stored at the regional and/or State level. In cases where regional offices elect to store/acquire data in a machine readable form, SAROAD formats must be used. Regions are asked to encourage States and local agencies to use AQDHS for storage and retrieval of air quality data in cases where its use is practicable. In some situations, regional offices may wish to make use of national ambient data processing systems. These decisions should be matters for EPA regional offices to negotiate with the State and local agencies.

On occasion, EPA headquarters will have special needs for detailed SLAMS data. In these circumstances, requests will be made through the appropriate regional offices, with allowance made for such limiting factors as data availability, format and retrieval capability. EPA headquarters will also require a tabulation of SLAMS, to be updated on an annual basis. This will consist of basic information related to station location, pollutants monitored, etc.

SAMWG believes that a goal of the regional offices should be the publication of an annual report summarizing SLAMS air quality data. The report should contain a tabulation of pertinent air quality statistics for each State. Existing publications provide a convenient reference point for further planning among Regions regarding report format, style, and consistency. The regional offices should initiate planning in FY-1978 for the publication of such reports. The target dates for beginning publication of these reports will vary from region to region according to the capabilities and resources of the data collecting agencies and regional offices. Further guidance on this will be given in FY-78.

SLAMS Recommendations

- EPA and State and local air pollution control agencies should work together to establish a carefully planned network of SLAMS whose size and distribution will be largely determined by the SIP needs of the State and local agencies and the regional offices.
- EPA regional offices should negotiate with State and local air pollution control agencies regarding the format, frequency, and timeliness of data required from SLAMS. Regional offices storing SLAMS data in machine readable form must use SAROAD formats. EPA headquarters requests for SLAMS data must be made through the appropriate regional office.
- EPA should require an up-to-date listing of all SLAMS as well as other pertinent information (location, pollutants monitored, measurement techniques utilized, siting descriptions, etc.). States should report such information to EPA on an annual basis.
- EPA should consider some form of technical assistance to State/local agencies with their own data handling systems to assure adequate compliance with data submittal requirements.
- Regional offices should initiate plans in FY-78 to prepare an annual summary report of air quality from SLAMS on a state-by-state basis. Additional guidance regarding contents, format, and alternatives for data

handling related to implementation of such a report will be issued in FY-78.

NATIONAL AIR QUALITY TREND STATIONS

National Air Quality Trend Stations (NAQTS) will consist essentially of a subset of the SLAM's network with emphasis being given to urban and multi-source areas. A few new stations may need to be established in some areas in order to meet NAQTS criteria. NAQTS, like SLAMS, must eventually conform to EPA siting criteria and operate according to quality assurance procedures that equal or exceed EPA's minimum specifications. The information provided from NAQTS will be used to answer a variety of questions related to the effectiveness of the national control effort. For example:

- Is air quality generally improving throughout the country?
- Are these improvements roughly consistent with emission trends?
- Are the improvements different among various sectors of the country?
- What areas of the country are experiencing broad-scale air quality deteriorations? Why?
- Are certain seasons more pronounced in terms of air quality trends or levels? Why?

It is recognized that NAQTS data can only be used as a rough guide to what may be actually happening in any particular urban area. A comprehensive evaluation of air quality within a specific urban area requires air quality information from a fully established SLAMS monitoring network. Such evaluations would ordinarily be performed on a routine basis by State and local agencies or by EPA regional offices, using data from State and local air monitoring stations in addition to NAQTS.

The purpose of officially sanctioning NAQTS is to remedy certain problems in the collection, analysis, and reporting of national air quality data. These problems have limited EPA's ability to report national air quality progress and modify national control policies for the criteria pollutants. It is envisioned that the network of NAQTS will result in the following improvements in the current monitoring system.

Reduce the Quantity of Data Reported to EPA Headquarters

At the national level, the number of air monitoring stations required to collect and routinely submit information to EPA headquarters will decrease substantially. For TSP, the number of stations required for national overview purposes will decrease from approximately 4000 stations to approximately 1000, a decrease of over 75 percent. Similarly, for SO_2 and NO_2, the number of monitors will decrease from 2500 and 1000 to approximately 400 and 150, respectively. For CO and oxidants, the number of NAQTS necessary are approximately 150 and 200. This represents nearly a 65 percent reduction in the number of stations now submitting data to EPA's national data banks. Overall, the strategy will result in a significant reduction in the number of observations routinely reported to the EPA national program.

Correct Site Information Deficiencies

Lack of specific knowledge about monitoring sites has hampered the ability of national users to evaluate air quality trends and patterns. Under the proposed system, each NAQTS will be extensively described in terms of orientation and distance from major sources, data quality, type of monitoring equipment, and other environmental factors relating to the exposure of the site and how well it represents the surrounding area.

Provide for More Complete and Timely Data

Agencies responsible for the NAQTS will ultimately be expected to submit complete, accurate, and timely data for analysis and reporting. This will occur primarily because (1) these sites will be well identified--late data would trigger inquiry and followup--and (2) a high priority will be given to resource and management commitments for their operation and the collection and transmission of their data. Validated NAQTS data will be submitted to EPA headquarters and available to national data bank users within 105 days after the end of each calendar quarter.

Substantially Enhance Data Quality

Monitoring at NAQTS must eventually be standardized and rigidly controlled. Monitors will be EPA reference or equivalent instruments and will be operated under quality assurance procedures equal to or more stringent than those which EPA sets as the minimum. As a result, data from this core of stations will be of uniformly* high quality, consistent with the best state-of-the-art field monitoring practices. Continuous monitors are preferred for pollutants other than TSP. Note: The legal schedule for replacement of non-reference or non-equivalent monitors is governed by the "grandfather clause" (40 CFR 51.17a) whereby non-equivalent instruments must be replaced before February 1980.

General Criteria for NAQTS

The basic criteria** for selecting candidate areas for NAQTS are urban population and pollutant concentration levels. The Bureau of the Census has defined a total of 248 urbanized areas in the country which have a combined urban population of 119 million people. Urbanized areas are defined by the Census as those having (1) a central city of at least 50,000 inhabitants, or (2) twin cities with contiguous boundaries which essentially form one community whose population exceeds 50,000. Generally, one or more of these urban areas are contained in a Standard Metropolitan Statistical Area (SMSA). Since pollutant-producing activities tend to be concentrated in urban areas, their population is a more realistic indicator of the need for monitoring than SMSA or AQCR population. Generally, a larger number of NAQTS are desirable in more polluted urban and multi-source areas. The number of NAQTS which will be located in specific areas will be based on population and historical concentration data.

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* Data collecting agencies are urged to develop procedures for assessing the quality of ambient data obtained from NAQTS (see quality assurance chapter).

**Further considerations in the design and siting of NAQTS are discussed in Appendix C.

Obviously, these criteria are not fully adequate for determining the precise number of NAQTS to be established in any particular area. The specific number of NAQTS and precisely where they are to be ultimately established, must be a joint decision among appropriate representatives of the affected agencies, the regional office, and EPA headquarters. Priorities for designation of NAQTS will obviously be determined by the (1) need for information in a specific area, (2) the degree to which a candidate monitor meets EPA siting criteria, (3) the type of monitoring equipment at the candidate site (continuous or manual; equivalent or non-equivalent) and (4) the timeframe and resources necessary to establish a station in full conformance with the intent and purpose of NAQTS.

In order to meet national objectives, a dual purpose monitoring approach is being proposed. The two purposes are to document (1) peak concentrations--long and short-term--and (2) concentrations in densely populated areas. This dual approach will provide information about the "worst" air quality in an urbanized area (that which the SIP's are designed to control) and also provide additional information regarding population exposure. SAMWG believes that both types of monitoring data are necessary to provide a balanced national overview of air quality trends and patterns of pollutant exposure.

In most instances, NAQTS should be sited* to reflect a neighborhood scale of representativeness. Measurements in the neighborhood scale represent conditions throughout some reasonably homogeneous urban sub-region with dimensions on the order of one to two kilometers. Homogeneity refers to concentration but could apply to land use as well. The exception to the need for monitoring at the neighborhood scale occurs with carbon monoxide (CO), for which measurement on a smaller* scale (middle scale) is needed in order to characterize the impact of locally generated emissions accomulating near heavily traveled streets in downtown or commercial areas and near major roadways.

The NAQTS TSP stations, in addition to providing basic information about the national and regional trends of TSP, will also be used as a source of information for non-criteria pollutants (e.g., trace metals, sulfates, and nitrates). This will be accomplished by having the State and local agencies forward

*See Appendix C

selected hi-volume filters for analysis and storage in EPA's filter bank.

In urban areas where NAQTS are designated, several NAQTS TSP monitors should be identified from which filters will be submitted to EPA headquarters. As a guide, a minimum of two such monitors should be selected in urbanized areas where population exceeds 250,000 and at least one monitor should be selected in urbanized areas where population exceeds 100,000. Existing NASN stations which are adequately sited are prime candidates since historical non-criteria pollutant data exist from these sites for long-term trend analysis. Not all filters from each of these two TSP stations need be submitted. Assuming a sampling schedule of once in six days, one-half the filters, or filters collected every twelfth day (approximately thirty filters per year per site), will be sent to EPA within thirty days of the end of the quarter. The analytical data will be returned to the States and local agencies within seven months. In situations where the collecting agency chooses to retain all of the NAQTS filters, the agency may operate a second monitor on a twelve-day schedule at the same location and satisfy EPA's requirements by submitting these filters.

NAQTS will not be established to evaluate the impact of specific point sources. This evaluation requires data from a moderate-sized network for each isolated source. If we consider the number of sources of potential concern, it is obvious that setting up ANQTS for them would prohibitively increase the number of national trend stations reporting data to EPA. EPA's strategy for assessing point source ambient impact is based on a combination of source monitoring and special purpose monitoring.

As previously indicated, NAQTS data must be stored in EPA's central data banks. To meet EPA headquarters needs, the goal is to have NAQTS data accessible to national users from the national data bank within 105 days after the end of each calendar quarter.

Since data handling capabilities vary considerably among the States and local agencies and among the regional offices, no single data handling scheme can be used by all. For example, it may prove feasible to have some agencies forward NAQTS data directly to EPA headquarters. In other cases, State and local agencies may require regional office assistance in preparing and screening NAQTS data before final submission to EPA headquarters. The regional offices should develop a plan which is mutually agreeable with EPA headquarters and the affected State or local agency which contains detailed schedules and procedures for handling and transmitting NAQTS data. At a minimum, the plan should outline the responsibilities of each organizational component in terms of data coding, editing, screening and checking, formating, etc. To meet the schedule called for above, the plan should ensure that accurate data are provided to EPA headquarters in SAROAD format within 90 days after each calendar quarter.

NAQTS Recommendations

- EPA and State and local agencies should work together to establish a small but well-defined core of NAQTS capable of minimally meeting national meeds for development of national control programs and policies, and evaluation of SIP's.

- Regional offices, with assistance from EPA headquarters, must negotiate a data handling plan with those State and local agencies responsible for collecting and submitting NAQTS data. The plan must contain a schedule whereby edited and valid NAQTS data are available to national data bank users within 105 days after the end of each data collection period (calendar quarter).

SPECIAL PURPOSE MONITORING

Special Purpose Monitoring (SPM) is defined as all ambient monitoring performed apart from the SLAMS and NAQTS networks. It is more flexible than these two networks; thus, it can be adjusted easily to accommodate changing priorities. SAMWG recognizes that the monitoring resources will not increase dramatically at any level. Therefore, SAMWG recommends that SPM be used to supplement the fixed monitoring network to make the overall effort more effective, available resources considered.

The SPM should have predetermined goals which provide useful data for a specific program activity. In addition, SPM should be given the same priority as the activity which it supports. The conduct of SPM must not jeopardize the production of timely fixed station data of high quality. On the contrary, SPM should enhance the usefulness of fixed station data (1) by increasing the coverage of that network with additional monitors for varying lengths of time, (2) by checking the validity and representativeness of the fixed network, and also (3) by producing data where none has been collected previously or where existing data are no longer valid.

A list of various program activities and uses which may require special purpose monitoring activities follows. Note that in some cases this monitoring could include the measurement of non-criteria pollutants at one or more of the SLAM stations if needed by the supporting agency.

- Determining air quality levels in areas suspected to be higher than air quality standards but not monitored under the SIP network.
- Developing and evaluating control strategies
- Determining nonurban background levels adjacent to metropolitan areas
- Validation of Dispersion models
- Determining the impact of large point sources on ambient air quality
- Quality assurance validity checks
- Characterizing significant air quality gradients
- Determining population-at-risk exposure
- SIP policy studies (fugitive dust, transport, etc.)
- Monitoring of non-criteria pollutants of special interest to State or local agencies.

For obvious reasons of compatibility and comparativeness, ideal SPM studies should be conducted with EPA reference or equivalent methods, under the same quality assurance program as the fixed network, and with proper use of applicable EPA siting guidelines. Exceptions may occur when a particular goal of the studies warrants the specific use of a non-reference/equivalent method or perhaps variable sampling frequency. The sacrifice of data comparability must be due to a special need of higher priority.

Special purpose monitoring activites are generally nonrecurring and of unique character in terms of pollutants monitored locations, frequency of sampling and other parameters of interest. For this reason, it is not practical for EPA (regions or headquarters) to store such data in a central data file. Information relating to both SLAMS and SPM would be of interest to a number of agencies involved in monitoring, provided such information could be obtained easily from a central location.

Therefore, information on SPM studies conducted by Federal, State, and local organizations should be stored in a clearinghouse for use by other agencies engaged in monitoring activities.

Special Purpose Monitoring Recommendations

- EPA and State and local air pollution control agencies should work together to establish a plan for special purpose monitoring (SPM) tailored to augment data from SLAMS and NAQTS.
- A cost and technical feasibility study should be initiated by EPA headquarters to establish procedures for setting up a clearinghouse for maintaining records and answering requests concerning the availability and location of special purpose air pollution monitoring data.

METEOROLOGICAL DATA TO SUPPORT AMBIENT MONITORING ACTIVITIES

The types and quantities of meteorological data that should be collected depend on factors such as the uses and analyses intended for the air quality data, the availability of representative meteorological data already being obtained by the National Weather Service and control agencies, the complexity of the meteorological/topographical situations, and the cost and difficulty of obtaining the data.

Uses of the SLAMS, NAQTS, and SPM network data have been discussed in the previous sections. Most of these uses will require meteorological data in accomplishing needed air quality assessments and in control policy formulation. The analyses performed may include adjustment of trends for meteorological differences between comparable time periods, normalizing of air quality data by comparing air quality measured in periods with similar meteorological conditions, developing and testing air quality simulation models to extend the information derived from monitoring stations both in time and space, and determining meteorological parameters needed to support programs to selectively control source emissions over certain geographical areas or seasonal periods. Various examples of these types of analysis can be cited from recent in-house and contractor studies.

The National Weather Service, through its numerous field stations, and also control agencies or their consultants, currently obtain meteorological data that would be adequate in many instances to fulfill the need for data of this type. Some of the data collected by the National Weather Service, such as upper air data, which is used in deriving transport and stability parameters, could not be easily or economically collected by control agencies. The National Weather Service through the facilities of NOAA's National Climatic Center at Asheville, N.C., has facilities and capabilities for storing and making available much of the needed data at a nominal cost. Hence, the need for additional meteorological data involves only those areas where existing meteorological data are insufficient or unrepresentative of local conditions. This need may arise from local peculiarities in emission sources (i.e., source height, shape, building downwash, etc.), meteorology (i.e., sea/lake breeze, urban heat island, etc.) or topography (i.e., hills, valleys, etc.).

It would be preferable to install meteorological sensors at SLAMS and NAQTS; however, this would in many cases result in duplication of data collection.. SAMWG recommends that the National Weather Service meteorological data be used to the extent possible. If National Weather Service data are not available, it may be practicable to install a central meteorological station at one of the NAQTS sites which is representative of several nearby NAQTS.

The meteorological data collected as part of fixed networks should be stored with the air quality data. The National Aerometric Data Bank provides meteorological data storage and retrieval capabilities for the NAQTS. This capability should also be provided in the system where the SLAMS data are stored. To facilitate data analysis, some meteorological tabulation and analysis programs should also be built into the systems, such as frequency distributions, wind roses, pollution roses, etc. These programs could be expanded or refined as required for purposes of SIP data analysis.

Meteorological Recommendations

- Insofar as possible, the National Weather Service meteorological data should be used in the interpretation of SLAMS, NAQTS, or SPM data. In some cases, special purpose meteorological data collection activites will be required to support the need to establish the impact of specific sources, determine pollutant transports, etc.

- The regional offices should review available meteorological information to determine its adequacy in representing meteorological conditions at or near NAQTS.
- NAQTS where existing meteorological data are not representative should be identified by the end of FY-78.
- Plans for collecting meteorological data in areas where data are inadequate should be implemented by the end of FY-1980.

SUMMARY OF RECOMMENDATIONS

The following is a summary of the major recommendations related to the future ambient monitoring program.

- State and local air pollution control agencies and EPA should evaluate their respective monitoring programs annually and modify them accordingly to meet the changing needs for monitoring information.
- EPA and State and local air pollution control agencies should work together to plan for and establish an ambient monitoring program which contains, as a minimum, the following:
  - (a) A carefully planned network of State and Local Air Monitoring Stations (SLAMS) whose size and distribution will be determined largely by the needs of State and local air pollution control agencies abatement and control programs;
  - (b) A small but well-defined core of National Air Quality Trend Stations (NAQTS) which minimally meets national needs for trend and SIP evaluations; and
  - (c) The conduct of Special Purpose Monitoring (SPM) tailored to augment data from SLAMS and NAQTS.
- EPA should take steps to modify existing monitoring regulations (40 CFR 51.17) to accommodate the need for SLAMS and

NAQTS, and to incrase the flexibility required by State and local agencies to conduct special purpose monitoring activities. Similarly, reporting regulations (40 CFR 51.7) should be modified to reflect the diminished need for large quantities of data at the national level.

- Data gathered from NAQTS should be received in EPA headquarters within 90 days of the end of a calendar quarter. EPA regional offices should negotiate with State and local air pollution control agencies regarding the format, frequency, and timeliness of data required from SLAMS and on an optimum handling procedure for NAQTS data. Regional offices storing SLAMS data in machine readable form must use SAROAD formats. EPA headquarters requests for SLAMS data must be made through the appropriate regional office. An inventory of SLAMS must be provided to EPA on an annual basis. EPA should consider some form of technical assistance to State/local agencies with their own data handling systems to assure adequate performance of data submittal requirements. Regions should initiate plans in FY-78 for annual publication of reports containing summary statistics of SLAMS air quality.
- A cost and technical feasibility study should be initiated by EPA headquarters with a view to setting up a clearinghouse for maintaining records and answering requests concerning the availability and location of air pollution data from significant special purpose monitoring studies.
- Insofar as possible, National Weather Service meteorological data should be used in the interpretation of air quality data gathered by SLAMS, NAQTS, or SPM studies.

CHAPTER IV

SOURCE MONITORING PROGRAM

INTRODUCTION

Source monitoring encompasses both area and point source monitoring activities. There currently are approximately 165,000 point sources and 3300 area (county) sources whose data are contained in the central EPA data bank. Point source monitoring (PSM) can be further broken down into two general categories, point source ambient monitoring and point source emissions monitoring.

Source monitoring activities are conducted or required by EPA and State/local control agencies to develop data and information in support of enforcement decisions and to implement and evaluate air programs policies and regulations. The addition of new program responsibilities including New Source Review (NSR) and Prevention of Significant Deterioration (PSD) and Energy Supply and Environmental Coordination Act (ESECA) regulations, as well as continuing program requirements such as evaluation and revision of State Implementation Plans (SIPs) indicate that program reliance on source monitoring data will increase in the future. Source monitoring should, therefore, be viewed as a discrete monitoring program entity with unique data gathering, handling, and reporting characteristics.

Atmospheric diffusion modeling, simulation modeling, greatly depends on source monitoring data as well as emission, meteorological, and topographic data in order to calculate the expected distribution of air pollutants from a source over an area. The continually increasing use of atmospheric dispersion modeling makes it imperative that source monitoring programs develop in a consistent manner.

Source/emission inventories are an integral component of source monitoring, and are utilized primarily in air quality management decisions. The inventories are of prime importance in the development of air pollution control strategies and are required for input to atmospheric dispersion models.

BACKGROUND INFORMATION ON POINT SOURCE MONITORING (PSM) DATA

The term "point source monitoring" is used here to designate activities which are conducted to (1) establish the contribution of an individual source to local air quality, (2) document continuing compliance with emission limiting regulations, by defining that source's emissions and its environmental impact, or (3) provide a general picture of the relative contributions of source categories and engineering information for large scale areas. PSM may consist of a variety of activities which can be generally placed in either of two categories, namely, emission and ambient monitoring.

Point Source Emission Monitoring

Point source emission monitoring (PSEM) may include the conduct of actual source tests, the collection and evaluation of continuous emission monitoring data obtained at the source, or the collection and analysis of specific source process data (including malfunction and upset information) which can provide an estimate of emissions from the source. Specifically, PSEM encompasses one or more of the following types of emission monitoring and data collection activities: (1) continuous source emission monitoring,

(2) manual source testing using reference methodology, (3) source process monitoring, e.g., fuel analysis for combustion sources (moisture, BTU, sulfur, ash, etc.), (4) malfunction and upset reporting, (5) source inventory data collection (for emission inventories), and (6) simulation modeling.

Point Source Ambient Monitoring

The ambient monitoring aspects of PSM are more limited in scope than those associated with general trend monitoring. The activity which is neither general source monitoring nor general ambient monitoring, is referred to as point source ambient monitoring (PSAM). It should be based on a consideration of such matters as appropriate selection of the number and location of ambient air monitors in the vicinity of the point source by use of appropriate models, coordination of data collection with emission monitoring activities conducted in the same study, collection and evaluation of the ambient air quality data produced in the study, and finally, coordination of meteorological data with monitoring data. An important difference between PSAM and general trend monitoring is that the former tends to be done on a case-by-case basis to satisfy a particular air pollution control and abatement requirement, with the responsibility and cost for conducting the PSAM frequently, though not always, borne by the source.

POINT SOURCE MONITORING USES AND REQUIREMENTS

The principal uses of PSM data in air quality planning, attainment/maintenance strategy development, standards setting, and enforcement action decision making are as follows:

- Development of emission requirements for major sources when making SIP revisions
- Determination of compliance status of sources for specific enforcement actions
- Verification of the adequacy of control strategies and associated SIP regulations to meet NAAQS
- Certification of fuel conversions under provisions of the Energy Supply and Environmental Coordination Act
- Development of more representative emission factors
- Development and validation of long and short-term air quality modeling procedures
- Conduct of new source review programs and implementation of strategies for the prevention of significant deterioration (PSD)
- Evaluation of unique citizen complaint problems.

In the immediate future PSM will likely be limited to certain emissions sources having significant impact on air quality or sources specifically identified for analysis for enforcement purposes. Approximately 21,000 such significant emissions point sources have been identified. Of these, the 2400 sources listed on the following page are most important as potential candidates for point source monitoring activities for enforcement purposes (excluding general emissions estimating requirements). PSM will principally involve sources of sulfur oxides and total suspended particulate matter, and, to a lesser extent, nitrogen oxides; emission inventory requirements include all criteria pollutants.

Source Category	No. of Facilities	Pollutants
Coal Fired Power Plants	394	TSP, SO_x, NO_x
Oil Fired Power Plants	288	TSP, SO_x, NO_x
Iron and Steel Mills and Coke Plants	250	TSP, SO_x
Non-ferrous Smelters	25	TSP, SO_x
Refineries (petroleum)	295	SO_x, HC, TSP, CO
Kraft Pulp Mills	232	TSP, SO_2
Municipal Incinerators	165	TSP
Portland Cement	192	TSP
Phosphate Fertilizer	261	TSP
Sulfuric Acid Plants	261	SO_x
	2363	

It has been suggested that all significant point sources should be routinely required to conduct PSM activities in the vicinity of their facilities in order that information on air quality impact of that source be available as the need arises. Section 114 of the Clean Air Act, as amended, authorizes the Administrator of EPA to require the owner or operator of any emission source to

> "...(A) establish and maintain such records, (B) make such reports, (C) install, use and maintain such monitoring equipment or methods, (C) sample such emissions (in accordance with such methods, at such locations, at such intervals, and in such manner as the Administrator shall prescribe), and (D) provide such other information, as he may reasonably require;"

This broad authority, according to section 114 (a), may be used for the purpose of developing (and reviewing) SIPs, for determining whether a source is in violation of any SIP or standard, and; for carrying out the emergency episode and energy authority of the Act. For these purposes, EPA may clearly place the burden for conduct and cost of any or all reasonable point source monitoring activities on the source management. Most states have comparable authority or can be delegated the Administrator's authority under §114 (b) (1) of the Act. However, in certain cases, the regulatory agency may choose to exercise full control over the cost and operation of a PSM activity. Where the conduct of PSM is performed by the source, the responsible control agency should review and concur in the source-proposed PSM program. Under SCS policy, certain sources are required to conduct PSM activities as part of their compliance plan, along with the other aspects of the SCS. The advantage of this approach is that the data will be available quickly. This is an important factor since violations can seldom be documented after the fact. The disadvantage is the substantial cost of such monitoring where, apart from SCS requirements, there is no well-defined prior need. Also a significant amount of the data collected will never be used, either because no need ever arises or the actual need is only for a short-term study, as is usually the case.

On the other hand, certain PSM requirements of limited scope, such as source process monitoring, may be advantageous to enforcement programs. For example, mandatory submission of fuel analysis data by power plants (utility and industrial boilers) could become a permanent part of control agency compliance monitoring activities.

Thus, sulfur content in fuel data could be used as an indicator of continuing compliance with sulfur oxide emission limitations when combined with other information about the source. The frequency of data submission could be dependent on the quality and variability of a coal or oil supply. For other categories of sources, process feed material analyses or flow rates may serve an analogous purpose.

In addition, there will develop a need for substantial amounts of point source monitoring in the near future as EPA and State/local control agencies attempt to further define significant pollutant contributor sources in non-attainment problem areas in order to establish more stringent emission limitations. In addition, certification for fuel conversions by combustion sources under ESECA will require PSM data in some cases. Other programs where the conduct of PSM activities by individual sources will be required include new source review procedures where source siting is evaluated under prevention of significant deterioration guidelines, determination of compliance status for enforcement purposes, and development of regulations. A critical requirement in these studies is a definition of baseline air quality in specific areas where PSM activities will be conducted.

POINT SOURCE AMBIENT MONITORING DATA

Currently, raw data generated by point source ambient networks are not normally submitted to EPA. This should continue to be the case given the overall goal to decrease the amount of reporting to EPA. This philosophy is particularly applicable to PSAM data since it need be reported only to the user, i.e., State or local agency or, when applicable, the appropriate EPA region. These data are normally collected for a specified, relatively limited period in the range of two months to two years, and have meaning primarily to the user who must make a decision based on the data, for example, to establish a new emission limitation for a SIP. The raw data has no routine value on a national level but may be needed for special studies and other purposes, such as diffusion model validation, evaluation of new monitoring techniques, guidance on establishment of new PSM systems, historical trends in local air quality, etc. For these reasons, a national clearinghouse containing an inventory of past PSAM activities, will need to be established by EPA. The national clearinghouse would supply information concerning the purpose for which the individual PSAM work was conducted, exact location of data, scope of data collected, duration of the study, source location, etc.

Recommendations

- It is recommended that raw data from PSAM activities not be submitted to EPA on a routine basis.
- It is recommended that a national clearinghouse be established to collect and store pertinent ambient monitoring information related to each PSAM activity conducted in order to centralize and facilitate dissemination of information concerning PSAM activities. A suitable component within EPA should be delegated the responsibility of establishing a PSAM national clearinghouse, develop inventory forms to be used by control agencies initiating PSAM

work, provide for management facilities for the national clearinghouse and establish procedures for reporting, collection, storage and dissemination of PSAM information. This inventory should be made widely available to regional offices, State, and local agencies.

- It is recommended that point sources not be required to routinely establish permanent full-scale PSAM programs to continually assess environmental input due to the high cost of permanent full-scale networks to the source and, more importantly, to the control agency in collection, analysis, and evaluation of data. However, this should be an option of the State or local agency and the regional office. Another consideration is a lack of well-defined need for routine PSAM data; however, EPA should examine the advantages of certain more limited PSM requirements such as submission of fuel analysis data by power generation sources and process feed data by other categories of sources as a compliance monitoring tool.

POINT SOURCE EMISSION MONITORING DATA

As indicated earlier, point source emission monitoring consists of continuous source emission monitoring, manual source testing using reference methodology, source process monitoring, malfunction and upset reporting, and source inventory data collection.

Continuous In-Stack Emission Monitoring Data

Continuous in-stack emission monitoring is now required for certain categories of both new and existing sources, 40 F.R. 46240, October 6, 1975. The categories of sources and pollutants regulated are given in Table IV-1, both for new sources under new

Source Performance Standards (NSPS) and existing sources under SIP. The purpose of continuous emission monitoring is to provide a continuous record of emissions after the initial performance test in order to ensure that the facility at all times employs proper operation and maintenance procedures to minimize emissions and maintain compliance. Under NSPS, the source must keep a record of continuous emissions monitoring data for a period of two years and submit to EPA or the appropriate delegated State a quarterly report on excess emissions occurring during the reporting period. Under the SIP's, States must establish similar continuous emission monitoring requirements. Currently, requirements have been established as indicated in Table IV-1. As can be seen from the list, the requirements are relatively complete for major sources of sulfur dioxide and nitrogen oxides. However, there are major gaps for monitoring opacity.

Information from continuous emission monitoring is, of course, a useful component of all PSM systems, since data on emissions is available for the same time frame as ambient air quality data. Useful data correlations, however, could be made at present only for sulfur oxides and nitrogen oxides. Correlations for particulate emissions are not possible at present because continuous monitors measure emissions opacity.

Source Testing Data

Manual source testing is mandated for sources subject to NSPS within 180 days after initial startup under 40 CFR part 60. It is also mandated for certain sources subject to National Emission Standards for Hazardous Air Pollutants (NESHAPS) under 40 CFR part 61. However, no periodic source test is now required by EPA either

TABLE IV-1
CONTINUOUS EMISSION MONITORING

Source Category	Pollutants	New	Existing
fossil fuel fired steam genrators	opacity SO_2	>250 million Btu/hr	>250 million Btu/hr SO_2 only if flue gas desulfurization
	NO_x		NO_x only where control strategy required
	O_2 or CO_2		O_2/CO_2 only if state has emission regulations
sulfuric acid	SO_2	all sources covered by NSPS	>300 ton/day production
nitric acid	NO_2	all sources covered by NSPS	>300 ton/day production and only where control strategy required
catalyst regenerators for fluid bed catalytic cracking units	opacity	all sources covered by NSPS	>20,000 BBl/day
electric arc furnaces	opacity	all sources covered by NSPS	no requirements
primary copper, zinc and lead smelters	opacity SO_2	all sources covered by NSPS	no requirements
ferroalloy production facilities	opacity	all sources covered by NSPS	no requirements

for new or existing sources. It has been EPA's practice to require source testing by way of §114 authority when compliance status is in doubt and at the completion of a compliance program set forth under an administrative order or consent agreement. Most State and local control agencies operate similarly, i.e., a high degree of flexibility is maintained concerning requirements for source testing. It is essentially a case-by-case decision and should remain so whether the source test provides data for an enforcement decision or standard setting purpose or as part of a broader PSM program. Whenever manual source testing is conducted every effort should be made to acquire simultaneous continuous monitor data where appropriate (i.e., where the source is subject to continuous monitoring regulations). This will be useful in (a) verifying that the source's continuous monitor is operating properly, (b) providing a quantitative basis for subsequent determinations of emission compliance, and (c) enhancing the probability that the source will keep the continuous monitor in proper operation and maintenance.

Source Process Monitoring Data

An additional aspect of emission monitoring is the valuable information provided by fuel analysis data in fuel consuming sources, and feed analysis data in certain chemical process sources. Such data may provide pertinent information concerning source emissions which can be an important part of PSM.

Recommendations

- It is recommended that continuous emission monitoring requirements continue to be set for all major sources and pollutants. Consideration should also be given to requirements for monitoring and reporting of process feed data such as fuel sulfur content or other relevant parameters which can provide an indication of a source's compliance status.

- It is recommended that high priority should be given by EPA to the development and improvement of continuous monitoring instruments for all major categories of sources and all regulated pollutants. It is specifically recommended that continuous monitoring instruments or other techniques be developed to monitor particulate emissions from industrial sources or alternately, to convert opacity measurements made by existing continuous monitors into particulate emission rates. EPA should also continue efforts to develop remote source and long path monitoring techniques to be used as adjuncts to PSM systems.
- It is recommended that EPA continue to establish QA procedures and techniques for validating the accuracy of data produced by source continuous monitors.
- It is not recommended that raw data from continuous monitors employed by industry in compliance with emission monitoring regulations be routinely reported to control agencies. Quarterly excess emission reports along with program mandated source inspections by the appropriate control agency provide an adequate system to enforce proper operation and maintenance at the source.

- It is recommended that EPA develop a system with a uniform format for use by State/local agencies to handle information from excess emission reports in order to minimize the source reporting burden and the control agency data analysis burden.
- It is recommended that manual source testing should continue to be a case-by-case decision to be made by the responsible control official whether it is to be required solely or as part of a more comprehensive PSM system.

AIR QUALITY SIMULATION MODELING

An air quality simulation model is a numerical method, based on physical principles, for estimating pollutant concentrations in space and time as a function of emission rates, meteorological conditions and terrain factors. A competent analyst, using an appropriate model and adequate and representative data can provide information which suggests how available resources may be allocated to produce the greatest improvement in air quality.

Air quality models can provide information on the location and magnitude of the maximum concentrations; the distribution of concentrations in relation to the distribution of population; the emission reductions needed to meet ambient air quality standards and significant deterioration increments; the effects of installation of control devices, process changes, the selection of sites for facilities, and the relocation of sources of pollutants; the interim suspension of major polluting activities; and tomorrow's or next year's air quality.

A fixed ambient air monitoring network provides data at a discrete number of locations. The outputs of a model can provide important data on the distribution of air quality concentrations between widely spaced ambient monitors. They can indicate the existence of "hot-spots" that otherwise may go undetected. The costs incurred may be a small fraction of costs of monitoring. However, for most relevant applications of models some minimum amount of monitored ambient air quality and emission data are essential. These data enable the performance of the model to be tested. The analyst can coincidentally evaluate monitoring and modeling data to identify background air quality data under a variety of meteorological circumstances. He can make appropriate adjustments to the model input data and identify the strengths and weaknesses of the numerical method used for the particular problem at hand. Finally, statements on the validity of the model application can be made with greater confidence, and the air pollution control official can use the data to assess more properly the consequences of his decisions.

Air quality simulation models are slowly improving. More definitive emission and ambient air quality data are providing better bases to judge the applicability of the models with more widespread use, the advantages and limitations of models are better understood. Greater emphasis is being placed on more standard or uniform application of the models; nevertheless, the diversity of the Nation's terrain, climate and configuration of the several thousands of sources of pollution dictates against a "cookbook" -

only approach. EPA currently has an ongoing program to develop a consensus of the scientific and air pollution control communities on the selection and application of air quality models for air pollution control purposes. Professional judgment in the selection and application of models will retain an essential role in air quality management.

Recommendation

> It is recommended that the use of dispersion models be fostered as a cost-effective technique to assess ambient air quality and the impact of point sources on the environment. EPA should encourage more standard, although probably not uniform, applications of models for particular pollutant species and pollution problems. EPA should issue an authoritative statement or guideline which has undergone comprehensive outside peer-review on this matter.

SOURCE/EMISSION INVENTORY

The source/emission inventory provides the most basic tool for air pollution control planning and management because it defines the probable causes of the air pollution problem. The inventory provides information concerning source emissions and defines the location, magnitude, and relative contribution of these emissions. It can be used to measure the effect of control activites and to indicate future problems. The emission inventory is used to predict ambient air quality, and, in conjunction with a permit or registration system, to provide up-to-date information on major sources of pollution. In addition, the emission inventory is a valuable guide in designing and evaluating air monitoring networks.

Emission inventory information, by defining the major source contributors (motor vehicle, industrial, etc.), influences national control programs.

The level of detail put into the compilation of an emission inventory depends to a great extent on the predominant use of such data and also on the user of the emission inventory data. At the national level, data from emission inventories is submitted to the National Air Data Bank (NADB), National Emissions Data System (NEDS) and is required for a variety of purposes. Included among the many uses are the following:

National Uses of Emission Inventory Data

- As an aid in the initial development of national strategies.
- EPA review and evaluation of proposed SIP control strategies.
- Identification and determination of relationships between specific emission sources or source categories and ambient air quality.
- As a mechanism to identify and locate sources that are out of compliance or that should have compliance schedules (interface with CDS).
- Preparation of national emission trends (EPA and CEQ).
- As a data base to be used to develop and improve general emission inventory procedures.
- As a mechanism to evaluate the need for and determine the priorities for development of new or improved emission factors.

- As a data base for use in development of alternative strategies for automobile emission controls.
- As a mechanism to provide data for projecting emissions and future air quality.
- As a data base for use in preparation of various Environmental Impact Studies so that the impact of a proposed new source is considered in context of sources and problems already in existence.
- As a data base for use in cost/benefit studies.
- To assess the national impact of specific types of sources with their current degree of control versus projected future controls.
- As a data base to assist in determining priorities for new research programs and new source performance standards.

Federal Regulations - Source/Emissions Reporting

Current Federal regulations pertaining to source emissions reporting (40 CFR 51.7b) require State agencies to semiannually submit data for selected point sources in the standard NEDS format.

The National Emissions Data System is a computerized data handling system which accepts, stores, and reports on information relating to sources of any of the five criteria pollutants (particulates, SO_x, NO_x, CO, and hydrocarbons). NEDS was created to provide a centralized source/emissions data bank for which standard input forms would be used and output reports could be generated to meet the requirements of the majority of users of source/emissions data. In NEDS, a major distinction is made between two types of sources: point sources and area sources. Point sources, in the broadest sense, are stationary sources large enough to be identified and tracked individually; although, per NEDS reporting requirements, they are any plants emitting more than 100 tons/year of any of the criteria pollutants. Area sources, on the other hand, are those stationary and mobile sources which individually emit much less than 100 tons/ year and are too small and too numerous to keep individual records on. In NEDS, area sources are considered collectively on a county basis. It is the responsibility of the States (as required by Federal regulations) to update the point source data semiannually. Area source data, because of their composite nature, are generally maintained centrally by NADB, although state-supplied data will be accepted in place of nationally derived estimates.

In its deliberations, SAMWG thoroughly discussed the existing regulations in light of the national uses of the collected emissions inventory data. The result of the Work Group's deliberations was an attempt to reduce the amount of data reported to EPA and the frequency of reporting. With this goal in mind, SAMWG in its December 1976 draft of the strategy document, proposed that the States submit a baseline inventory to EPA. This inventory called for less detail than the current Federal regulations. During the workshops held to discuss the strategy document, many State and local participants pointed out that their agency's emission inventory needs require a more detailed level of emission inventory data than the items which would have comprised SAMWG's proposed baseline inventory. Since the State and local agencies have a continuing need for the more comprehensive inventory and the baseline inventory would require a different reporting and compilation format, preparation and submission of the baseline inventory reports as proposed would have required the expenditure of additional resources. In light of this situation, it was concluded that the more comprehensive emission inventory reporting requirements of the current regulations should be retained and an emissions inventory task force should be formed to recommend what specific items should be included in the comprehensive inventory. The current suggestions of the Work Group is that the emission inventory reported to EPA for each criteria pollutant should be continued. The inventories should include sources that have actual emissions of 100+ tons/year of each of the following: suspended particulates, sulfur dioxide, nitrogen dioxide, hydrocarbons, and carbon monoxide. As additional air quality standards are promulgated, the emission reporting level for each pollutant should also be specified. The strategy reviewers had no objections to the SAMWG's recommendation to change emissions inventory reporting from a semi-annual basis to an annual basis.

When diffusion modeling is to be used, a detailed inventory including data such as the following, are required: UTM coordinates, SCC codes for each process, stack data, (e.g., height, diameter, temperature of exhaust gases and flow rate), and percent of fuels used for space heating and seasonal production rates. The information needed for a detailed inventory is identical to that required for a NEDS inventory except that the total county area emissions would need to be apportioned by source category on a grid basis. The detailed inventory fills all the needs of annual dispersion models. For short-term models, diurnal source information is necessary. Point source inventories have always been collected by the responsible State or local agency. Area source (county) data in the main have, in the past, been compiled and analyzed by EPA headquarters. However, the increasing importance of HC, CO, and NO_x, all of which have area sources as a significant contributor, indicates that State/local control agencies, who have not collected such data should be placing an increasing importance on the knowledge and availability of area source emissions data.

Compliance Data System

For purposes of clarification, another inventory system which is not covered under the Federal reporting regulations 40 CFR 51.7, should be briefly discussed.

This separate inventory system, the Compliance Data System (CDS), was developed to assist the Environmental Protection Agency in carrying out its enforcement and surveillance programs. It is used to record information on identified major polluting facilities to provide information about the compliance status of these facilities; and to keep track of enforcement actions taken by regulatory agencies against these facilities.

CDS provides users with an effective tool for managing large quantities of non-parametric stationary source information in an efficient and expeditious manner. The system can store, update, and retrieve large quantities of data describing the compliance status and the enforcement activites of all major and many minor sources of stationary air pollution. In effect, CDS is an automated tickler file which provides both historical and current record keeping capabilities.

A great deal of information must be readily available to those responsible for conducting a successful enforcement program for stationary sources of air pollution. CDS accomplishes the following:

(1) It provides an inventory of those sources of pollution which are affected by Federal, State, or local emission regulations and a fast retrieval capability for details about them.

(2) It provides both milestone (summary) reports and listings of facilities which are in compliance, out of compliance and of unknown compliance status with State, local, and Federal regulations.

(3) It tracks enforcement actions scheduled into the future and also can provide an historical report of actions scheduled or achieved in the past.

(4) It can be used to prepare special reports. With the retireval capability, CDS can be used to prepare special reports based on standard industrial class (SIC) codes, on New Source Performance Standards, or on any other criteria based on user needs.

(5) It can be used to coordinate State and local enforcement programs. In some States, enforcement and compliance information can be fed directly from the State into CDS. In all States, CDS can provide highly effective turnaround documents used by States for providing the region with new or additional enforcement information; and

(6) It can be used to anticipate future enforcement requirements. CDS has a great deal of built-in flexibility, and it is being constantly upgraded to meet current and anticipated user requirements.

CDS requires that data be maintained on sources that have the potential for emitting at least 100 tons/year of a specific pollutant. Potential emissions instead of actual emissions were adopted as the source criteria for a number of reasons:

(1) A data base was desired that did not fluctuate with production, use, or governmental restriction. The data base would remain relatively constant and would permit statistical and performance evaluations.

(2) A need existed to monitor continually the performance of sources even after control efforts had been realized. Sources which have the potential to substantially impact air quality in the event of a malfuction or because of poor maintenance should be monitored for continued compliance on a routine schedule.

(3) The total number of potential 100 ton/year emission sources nationwide represented a reasonable amount of sources for Federal oversight, and their total emissions represented the bulk of the pollution problem.

(4) 100 ton/year actual emission sources have a discernible ambient air quality impact. Therefore, when they are controlled to less than 100 ton/year, these must be monitored to assure attainment even if controlled to 90 + %, since non-compliance through malfunction, control deterioration, or other reasons would result in an air quality impact. As an example, a source of 1000 ton/year actual emissions which was 95% controlled would emit only 50 ton/year. But if the control deteriorated to 80%, 200 ton/year of emissions would result. If the cutoff were 100 ton/year actual, this source would not be monitored.

It should be emphasized that the SAMWG recommendations regarding source emission inventories only refer to the Federal regulations (40 CFR 51.7) which cover the recording and submittal of reports which must follow the procedures and forms originally described in APTD-1135, Guide for Compiling a Comprehensive Emission Inventory. The SAMWG recommendations do not at this time address or affect the separate requirements of the Compliance Data System (CDS).

Source/Emission Inventory Recommendations

- Comprehensive emission inventories should be upgraded annually to include all new or modified sources and all sources that have ceased operations during the year. Data should be submitted to EPA, in the NEDS fixed format machine readable form, within 180 days after the end of the calendar year. Data may be submitted more frequently as they become available. If a source's inventory has not changed, the year of record should be updated. The inventories should include criteria pollutant point sources actual emissions and area sources for those areas where the NAAQS are either violated or threatened. The point source inventories should include sources that have actual emissions of: 100+ tons/year of each of the following: suspended particulates, sulfur dioxide, nitrogen dioxide, hydrocarbons, and carbon monoxide. As additional air quality standards are promulgated, the emission reporting level for each pollutant should also be specified.

- Detailed diurnal emission inventories necessary for short-term (hourly, daily) dispersion modeling should be collected by State and local agencies only as needed. Agencies using diffusion models for development, evaluation, or revision of a SIP should retain the inventory for a period of time as specified by the EPA regional office.

- Improved guidance for compiling emission inventories should be developed by EPA. In order for this document to reflect the needs of its intended users, a group comprised of State and local and EPA representatives should be established to recommend items to be included within each point and area source data category to be reported.

SUMMARY OF RECOMMENDATIONS

- EPA program offices should assist RO's and State and local agencies by defining PSM data needs for specific program areas and also assist in the conduct of programs when PSM may be required. This support may be in the form of technical support documents to define under what program circumstances PSM may be desirable. Generally, discretion and flexibility to apply PSM requirements should rest with RO's or State and local agencies except for requirements specifically regulated such as continuous in-stack source emission monitoring.

- The burden of conducting and paying for point source monitoring should be placed on the responsible source to the extent possible. Factors such as cost of monitoring, sensitive litigation, and special studies may mitigage this rule. This decision should be made by the appropriate control agency official on a case-by-case basis.

- Control agencies should provide an overview of PSM programs developed by sources required to do so by virtue of control agency requirements. Appropriate review and concurrence of proposed PSM programs, with final acceptance being based on how effectively the proposed PSM will satisfy pertinent program requirements, should be an integral part of this oversight activity.

- Appropriate quality assurance (QA) procedures for conduct of PSM activities should be established. Acceptance of source-generated PSM data should be premised on use of standardized QA procedures. EPA should provide appropriate technical assistance to State and local agencies relating to QA procedures.

- Raw data from point source ambient monitoring activities should not be submitted to EPA on a routine basis.

- It is recommended that a national clearinghouse be established to collect and store pertinent ambient monitoring information related to each PSAM activity conducted in order to centralize and facilitate dissemination of information concerning these activities. A suitable component within EPA should be delegated the responsibility of establishing a PSAM national clearinghouse, develop inventory forms to be used by control agencies initiating such activities, provide for management facilities for the national clearinghouse and establish procedures for reporting, collection, storage and dissemination of PSAM information. This inventory should be made widely available to regional offices, State, and local agencies.

- Point sources should not be required to establish permanent full-scale PSAM programs to continually assess environmental impact due to the high cost of permanent full-scale networks to the source and, more importantly, to the control agency for the collection, analysis and evaluation of data. However, this should be an option of the State or local agency and the regional office. Another consideration is the lack of a well-defined need for routine PSAM data; however, EPA should examine the advantages of certain more limited PSM requirements such as submission of fuel analysis data by power generation sources and process feed data by other categories of sources as a compliance monitoring tool.

- Continuous emission monitoring requirements should continue to be set for all major sources and pollutants.

- High priority should be given by EPA to the development and improvement of continuous monitoring instruments for all major categories of sources and all regulated pollutants.

- EPA should continue to establish QA procedures and techniques for validating the accuracy of data produced by source continuous monitors.

- Raw data from continuous monitors employed by industry in compliance with emission monitoring regulations should not be routinely reported to control agencies. Quarterly excess emissions reports along with program mandated source inspections by the appropriate control agency provide an adequate system to enforce proper operation and maintenance at the source.

- EPA should develop a system with a uniform format for use by State/local agnecies to handle information from excess emission reports in order to minimize the source reporting burden and the control agency data anlaysis burden.

- Manual source testing should continue to be a case-by-case decision to be made by the responsible control official whether it is to be required solely or as part of a more comprehensive PSM system.

- The use of dispersion models should be fostered as a cost-effective technique to assess ambient air quality and the impact of point sources on the environment. EPA should issue guidelines to assist State and local agencies in the application and calibration of validated models.

- Comprehensive emission inventories should be updated *annually* by the appropriate control agency and *submitted* to EPA. If the inventory for a source has not changed, the year of record should be updated. The inventories should include criteria pollutant point source *actual* emissions and area sources for those areas where the NAAQS are either violated or threatened. The point source inventories should include sources that have *actual* emissions of: 100+ tons/year of each of the following: suspended particulates, sulfur dioxide, nitrogen dioxide, hydrocarbons and carbon monoxide. As additional air quality standards are promulgated, the emission reporting level for each pollutant should also be specified. Data should be submitted to EPA, in the NEDS fixed format machine readable form, within 180 days after the end of a calendar year. Data may be submitted more frequently as they become available.

- Detailed emission inventories necessary for dispersion modeling should be collected by State and local agencies only as needed. Agencies using diffusion models for development, evaluation, or revision of a SIP should retain the inventory for a period of time as specified by the EPA regional office.
- Improved guidance for compiling emission inventories should be developed by EPA. In order for this document to reflect the needs of its intended users, a group comprised of State and local and EPA representatives should be established to recommend items to be included within each point and area source data category to be reported.

CHAPTER V

FUTURE MONITORING PROGRAM FOR NON-CRITERIA POLLUTANTS

INTRODUCTION

The categorization of air pollutants as criteria or non-criteria pollutants comes from the provisions of the Clean Air Act of 1970. The Act requires that EPA establish air quality criteria and national ambient air quality standards for pollutants which have an adverse effect on public health and welfare and which have widely distributed mobile or stationary sources. There are six "criteria" pollutants regulated under this part of the Act. These are sulfur dioxide, nitrogen dioxide, total suspended particulates, carbon monoxide, non-methane hydrocarbons, and photochemical oxidants. In April 1976, EPA proposed lead as a possible seventh criteria pollutant.

Because of the extensive and explicit requirements of the Act for criteria pollutants, all other pollutants have come to be known collectively as non-criteria pollutants. This is a somewhat artificial category in that it contains a very large number of chemically heterogeneous pollutants whose single common attribute is that they do not fall under sections 108, 109, or 110 of the Clean Air Act.

In the past, the effectiveness of non-criteria pollutant monitoring by EPA and other agencies has suffered from a lack of coordination of monitoring activities, the absence of centralized direction over instrumentation and procedures and insufficient lead time for developing new monitoring methods. Non-criteria pollutant monitoring has generally produced data of unknown precision and accuracy. Moreover, data coming from various sources have been difficult to compare. Responding to pressures to develop regulations and standards, EPA has used whatever data could be assembled. This has meant, in some cases, that the Agency has inadvertently become committed to monitoring with methods which were chosen hastily since time did not permit necessary development and comprehensive evaluation of methods, or field trials of selected or alternative methods. In the past, EPA has been reluctant to use non-criteria pollutant data developed by other agencies, both Federal and non-Federal, and by private industry because of a concern about the adequacy of quality assurance programs used in gathering the data. Also EPA has not been able to provide adequate technical leadership to the monitoring community for the collection of non-criteria pollutant data.

Included in the non-criteria category are pollutants which are regulated only under Section 111 and 112 of the Clean Air Act. However, the largest group of non-criteria pollutants of concern are the so-called "toxic substances" which will probably become subject to regulation now that the Toxic Substances Control Act has become law. A tentative list of the principal non-criteria pollutants of concern is given in Table V-1. The list is not final and is presented with the understanding that it needs to be critically reviewed for the purpose of establishing priorities. This review and establishment of priority should involve appropriate elements of EPA and State and local air pollution control agencies. For the purpose of this review by the Standing Air Monitoring Work Group, non-criteria pollutants do not include airborne pesticides or radio-active materials.

A number of the organizations engaged in non-criteria pollutant monitoring are presented in Table V-2. It is common for a number of organizations to be interested simultaneously in the same non-criteria pollutant, although each organization may have established different monitoring objectives. Monitoring objectives range from just demonstrating that a pollutant is present to making accurate measurements of pollutant concentrations over a wide geographical range and sampling over protracted time periods. This multiplicity of pollutants, monitoring organizations, and monitoring objectives has resulted in a wide variety of non-criteria pollutant monitoring activities. Therefore, it is extremely important that EPA establish policies and implement a well-coordinated program to assure that reliable non-criteria data are collected in a timely fashion to meet Agency needs, and that monitoring data collected by different organizations and techniques are interrelatable. It is the view of the Standing Air Monitoring Work Group that there are a number of general areas in which steps can be taken to improve the effectiveness of non-criteria pollutant monitoring activities and these are discussed below.

BASELINE INVESTIGATIONS OF NON-CRITERIA POLLUTANTS

Elsewhere in this strategy document, there is a discussion of the establishment of permanent trend sites for criteria pollutants. It is the viewpoint of SAMWG that a continuing baseline program of non-criteria pollutant monitoring should be conducted at these permanent trend sites and other appropriate locations. This should

Table V-1

Tentative List of Non-Criteria Pollutants*

Acrolein
Aeroallergens
Aldehydes
Ammonia
Ammonium bisulfate
Ammonium sulfate
Aniline
Asbestos
Arsenic
Barium
Benzene
Benzidine(s)
Benzo[a]pyrene
Beryllium
Bis-chloromethyl ether
Cadmium
Carbontetrachloride
Chlorinated benzenes
Chlorinated phenols
Chlorine
Chloroform
Chloroprene
Chromium
Cobalt
Copper
Ethylene
Ethylene dibromide
Ethylene dichloride
Ethylene oxide
Formaldehyde
Hydrogen sulfide
Hydrochloric acid
Iron
Lead
Manganese
Mercury
Methyl Iodide
Mycotoxins
α-Naphthylamine
Nickel
Nickel Carbonyl
Nitrate
Nitric Acid
Nitric Oxide
Nitrobenzene
Nitrosamines
Noble Metals
Numerous iminoheterocyclics
Numerous polycyclic aromatics
Organic lead
Organic sulfates
Peroxy acetylnitrate
Phenol
Phosgene
Polybrominated biphenyls
Polychlorinated biphenyls
Respirable particulates
Selenium
Sulfate
Sulfuric Acid
Styrene
Tetraethyl lead
Trichloroethylene
Tris-2,3-dibromopropyl phosphate
Vanadium
Vinyl Chloride
Vinylidene chloride
Zinc

* The order of presentation of pollutants in this table does not reflect any prioritization by SAMWG.

TABLE V-2

PRINCIPLE ORGANIZATIONS INVOLVED IN NON-CRITERIA POLLUTANT MONITORING

Organization	Monitoring Function
EPA	
Environmental Monitoring & Support Laboratory	Monitoring in support of air program objectives, analysis and maintenance of NASN filter bank, development and technical assistance to EPA Regional Offices.
Environmental Sciences Research Laboratory	Develop new methodology for measuring air pollutants, carry out research in atmospheric chemistry and air pollutant transport.
Office of Air Quality, Planning & Standards	
Strategies & Air Standards Division	Monitoring data acquired to support standards and regulatory decisions.
Monitoring and Data Analysis Division	Analyses and data bank maintenance.
National Enforcement Investigations Center	Monitoring to support requirements of OGC and other EPA components.
Regional Offices, Surveillance & Analysis Divisions	Activities in planning, enforcement, and problem evaluation.
Other Federal Agencies	Monitoring pursuant to requirements of NEPA or ESECA, etc.
State and Local Agencies	Activities in planning, enforcement, and problem evaluation.
Other Organizations	
Universities	Research studies, contracts, and grants.
Private firms	Required or self initiated studies for various purposes for CAA, ESECA, etc.
National Bureau of Standards	Development of standard reference materials.
American Society for Testing and Materials (ASTM)	Development of standard procedures.

be of the type that is presently conducted for NASN sites (the particulate matter collected is analyzed for components such as benzo(a)pyrene, sulfates, nitrates, and trace metals).

The value of such a program is demonstrated by the present effort to establish a standard for lead and the investigations into the possible control of such compounds as benzo(a)pyrene and sulfates. These efforts are strongly supported by information from the NASN filter bank.

The objective of a baseline investigative effort is to collect non-criteria pollutant samples from different geographical locations with distinct atmospheric characteristics. A collection of such samples provides a preliminary indication of the location of important pollutant sources and sampling over a period of years provides additional indications of trends in pollutant concentrations.

It should be emphasized that data from a baseline network cannot be expected to provide comprehensive information about a non-criteria pollutant and would not eliminate the need for more extensive and special studies.

ANTICIPATORY MONITORING RESEARCH AND DEVELOPMENT

The importance of establishing a workable method for initial data collection and the time required to complete method development argue in favor of anticipatory research and development on monitoring methods. Until EPA anticipates rather than reacts to monitoring needs, a crisis atmosphere is bound to prevail, and air pollutant data will continually be questioned.

A complete program of method research and development should include a survey of alternative measurement principles and instrumentation, method evaluation, comparative testing of candidate methods, and field testing of the selected method. Research and development for monitoring methods should be a balanced program ranging from periodic surveys of what existing technologies should be adopted for short-term operational monitoring to more basic research on the development of new monitoring principles.

A pervasive difficulty with anticipatory research and development is the large number of possible non-criteria air pollutants and the uncertainty as to which non-criteria air pollutants might be the subject of the next crisis. This uncertainty cannot be completely resolved. However, steps can be taken to lead anticipatory activities in a direction with a high probability of payoff. SAMWG believes that responsibility and sufficient resources should be assigned to a specific program within EPA to conduct anticipatory monitoring research and method development activities. It is essential that the activities be closely coordinated with EPA's existing research, field monitoring, and quality assurance activities to prevent any duplication of effort or waste of resources. A second essential step is for EPA to develop, with significant input from environmentally oriented medical experts, a priority list of non-criteria pollutants for which a monitoring method is likely to be needed. The basis for such a list is a coordinated assessment of pollutant toxicity and prevalance in the environment.

The Work Group also suggests that EPA operate a small pilot network of monitoring sites so that (1) the new measurement methodology could be evaluated under closely controlled conditions, (2) internal quality control procedures could be perfected, (3) data manipulation techniques could be developed, and (4) external quality assurance requirements could be evaluated. The pilot network stations could approximate field conditions and be located in different urban atmospheres. Such a network would provide perfected monitoring systems which could be made available to the general air pollution monitoring community with a high degree of assurance that the methods would work satisfactorily.

It is also the observation of the Work Group that the method development which has occurred has tended to be in the area of ambient monitoring. In some cases, development activities could be more profitably focused on source emissions monitoring methods, which, in combination with mathematical modeling and limited ambient monitoring, may give better estimates of air quality than ambient air monitors alone. This approach appears to be particularly valid for a pollutant emitted from a single stack or a small number of sources. As in ambient monitoring, field testing of source sampling methods should be a prerequisite to EPA selection and endorsement of a source monitoring method.

EXCHANGE OF NON-CRITERIA POLLUTANT MONITORING INFORMATION

At the present time, organizations at the Federal, state, and local levels of government and in the private sector are engaged in non-criteria pollutant monitoring, but there appears to be little exchange of information concerning the monitoring methods used and little circulation of the data obtained from the various non-criteria pollutant investigations. In view of the considerable experience and expertise which has been developed outside of EPA, it is the opinion of SAMWG that EPA should establish a central information point for collection and dissemination of this information about non-criteria pollutant monitoring projects.

Increased involvement of non-Federal agencies could have benefits: more comprehensive investigation, sharing of costs, and a greater mutual understanding of the pollutant problem. Some non-criteria pollutant problems could be addressed by State or local action without Federal intervention. Also, the exchange of information would facilitate standardization of monitoring methods.

While the Work Group is in favor of greater cooperation between Federal and non-Federal agencies in non-criteria pollutant monitoring, the precise basis for such coordinated activity should probably be determined by the specific case at hand. In some cases, these activities should be mutually funded, and in others it may be appropriate for EPA to underwrite the cost of the cooperating agency's involvement. Generally, involvement of State and local agencies should be through the EPA regional offices.

FUNCTIONAL MANAGEMENT OF NON-CRITERIA POLLUTANT MONITORING

It is the recommendation of the Work Group that EPA should establish a group with the authority and resources needed to provide centralized direction of non-criteria pollutant monitoring. It is essential that this be closely coordinated with EPA's quality assurance, methods standardization, and air monitoring equivalency programs and with research activities. It should be made clear that centralized direction would extend only to how monitoring should be conducted. It would not determine such particulars as when, how much, and by whom non-criteria monitoring would be done. Specifically, direction of non-criteria pollutant monitoring should include:

1. Recommendation of the best monitoring method available for use by the Agency components that need to monitor for a non-criteria pollutant.

2. Recommendation of quality assurance activities needed for each measurement system.

3. Collection and dissemination of information about current or previous monitoring efforts for non-criteria pollutants.

The benefits of such management would be substantial: the quality of the data collected would be adequately documented; the data would be interrelatable; the results of previous monitoring would be available to influence decisions concerning the need for additional monitoring; and there would be a sound basis for expert testimony in support of data collected by established procedures and methods.

In a crisis situation, the centralization of non-criteria functional management would afford a single point for making decisions on the adequacy of existing methods and for initiating development of a new method on an accelerated basis.

IMPLEMENTATION

The Work Group observes that implementing the above recommendations could lead to functions which overlap; therefore, SAMWG suggests that all the recommended functions should be the responsibility of a single group within EPA.

The activities of such a program would be divided between continuing research and development of monitoring methods and direct support of monitoring programs initiated by other organizations. The preliminary job for the program would be to establish a list of priority needs for routine and new monitoring methods after appropriate consultation with other concerned EPA organizations. This would be followed by the survey of available methods for each pollutant on the list, and the preliminary selection of a promising monitoring technique. The complete evaluation of the method would be accomplished through comparative and collaborative testing, and the establishment of performance, data, and quality control systems. The Work Group envisions that method development and improvement would be a continuing process, with each selected method fully field tested in a pilot network of stations situated in various urban atmospheres.

SUMMARY OF RECOMMENDATIONS

- EPA should implement a program to assure that non-criteria monitoring data collected by different organizations and techniques are interrelatable.
- EPA should continue its baseline program of non-criteria pollutant monitoring by analyzing samples from the TSP NAQTS network, and other appropriate locations on a routine basis. EPA should publish this information annually.

- EPA should set up a small pilot network of monitoring sites where new measurement methodologies and quality assurance techniques can be evaluated.
- EPA should establish a central information point for the collection and dissemination of information on non-criteria pollutant projects covering both ambient air and source monitoring.
- State and local agencies are strongly encouraged to coordinate their own non-criteria pollutant monitoring with EPA's so that the best available methods and quality assurance techniques are used.
- In consultation with state and local agencies and with appropriate medical experts, EPA should develop in order of priority, a list of important non-criteria air pollutants.

CHAPTER VI

QUALITY ASSURANCE ACTIVITIES FOR AMBIENT AND SOURCE MONITORING

INTRODUCTION

In order for air monitoring data to be useful, it must be of acceptable quality. The dissemination and use of data of poor or unknown quality can lead to confusion and possibly incorrect decisions with regard to environmental standards and regulatory actions. The gathering of air monitoring data under the umbrella of a quality assurance program does much to avoid regulatory mistakes, and all control agencies should vigorously pursue the implementation of such measures. It is important to understand that these quality assurance programs apply both to ambient air measurements and to measurements of emissions from stationary sources. Both types of air monitoring data need to be collected under the auspices of sound quality assurance programs because both are used in making important decisions. Data of unknown or suspect quality are not much better than no data at all.

The major elements of support needed by the air pollution monitoring community for a satisfactory quality assurance program are (1) the availability of an evaluated measurement methodology which is adequate for its intended purpose, (2) satisfactory performance by organizations collecting the air pollution monitoring data, (3) assessment of the performance of monitoring agency by an independent outside agency, and (4) the availability of competent technical assistance for organizations needing to improve their performance. It is imperative that the monitoring program's management be committed to a quality assurance program and that adequate resources be available to carry on the activities involved in its major elements.

To be sure, the implementation of a formal quality assurance program does have its price, but the cost of collecting good air monitoring data is far less than the cost of making incorrect regulatory decisions because of poor data. Experience has shown that an agency should be prepared to spend between 10 and 25 percent of its monitoring budget to develop and implement the type of quality assurance program discussed below.

DEVELOPMENT AND IMPLEMENTATION OF AIR POLLUTION MEASUREMENT QUALITY ASSURANCE PROGRAMS

Federal, State, and local agencies all have important roles to play in developing and implementing satisfactory quality assurance programs. EPA's responsibility is to develop the tools needed to carry on a quality assurance program, and it is up to the State and local agencies to implement the programs.

Role of EPA Headquarters

EPA Headquarters has the following responsibilities:

- To be certain that the methods and procedures used in making air pollution measurements, both of ambient air quality and stationary source emissions, are well evaluated and that their limits of precision and accuracy are well understood. An important part of this responsibility is the certification of existing air monitors as to whether they conform to the requirements of 40 CFR 53 (equivalent and reference methods).
- To determine the performance of laboratories making air pollution measurements of importance to the regulatory process. The use of external performance audits is emphasized in this part of the program.
- To implement satisfactory quality assurance programs over EPA's air pollution monitoring, both ambient and source, which have the potential for generating data used for setting standards.
- To be certain that air monitoring data of importance to the regulatory process is of satisfactory quality.

- To render technical assistance to the air pollution monitoring community.

Role of the EPA Regional Offices

The major responsibility of EPA's regional offices is the coordination of quality assurance matters between the various elements of EPA and the State and local agencies. This role requires that the regional offices make available to the State and local agencies the technical information and quality assurance programs which EPA headquarters has developed and make known to EPA headquarters the unmet quality assurance needs of the State and local agencies. Another very important function of the regional office is the evaluation of the ability of State and local agency laboratories to measure air pollutants of regulatory concern. To be effective in these roles, the regional offices should maintain and strengthen their technical capabilities with respect to air pollution monitoring.

Role of State and Local Agencies

The major responsibility of State and local agencies is the implementation of satisfactory quality assurance programs over the monitoring which yields the air quality data needed for the regulatory process. It is the responsibility of State and local agencies to implement these programs in their own laboratories and in any consulting and contractor laboratories which they may use to obtain ambient and source emission data of importance to the regulatory process.

MINIMUM QUALITY ASSURANCE PROGRAMS

Comprehensive quality assurance programs in air monitoring are relatively new, and many agencies responsible for air monitoring have not formalized their quality assurance activities into an identifiable program. As an aid to agencies who are developing quality assurance programs, and agencies who wish to review existing programs, we present here those activities we consider to be essential in an air pollution monitoring quality assurance program. These essential activities and other aspects of a complete quality assurance program are described in detail in "Quality Assurance Handbook for Air Pollution Measurement Systems - Volume I, Principles (EPA-600/9-76-005), and this document should be consulted in establishing or evaluating a quality assurance program.

A suggested sequence for the development of a quality assurance program is given below. About 12 months is required for complete implementation, and we suggest that agencies begin developing this program no later than the beginning of FY-78 (October 1, 1977).

Develop Immediately

- Agency Quality Assurance Policy and Objective

Each State agency should develop a written quality assurance policy consistent with national quality assurance policy. This should be made known to all agency personnel and, as a minimum, should create an awareness of quality assurance activities, provide specific procedures for implementing a quality control program, provide for corrective action when required, state quality assurance objectives for each major monitoring project operated by the agency, and explicitly delegate authority to implement quality assurance systems planned by management officials.

- Organization and Responsibilities

An organization chart showing the key agency personnel and their area of quality assurance responsibility should be prepared. A quality Assurance Coordinator should be designated for the agency. This designee should be responsible for the coordination of quality assurance activities within the agency and with other agencies.

Develop Within Six Months

- Measurement Method Review and Application

All existing methods (sampling and analysis) used for routine ambient air and source emission measurements should be reviewed and revised if necessary; written procedures should be prepared where none exist. A document control system should be developed for these methods to keep agency personnel abreast of changes in methodology. Any ambient air monitoring for criteria pollutants conducted under State Implementation Plans must use EPA's reference methods or EPA-approved equivalent methods or have plans and schedules for meeting this requirement by no later than February 1980. States that have received a delegation of authority to enforce the Standards of Performance for New Stationary Sources and the National Emission Standards for Hazardous Air Pollutants must use the EPA reference methods or EPA-approved alternate or equivalent methods when monitoring for these regulated pollutants.

- Calibration Procedure Review

Calibration procedures used for all measurement methods should be reviewed, revised if necessary, documented, and included in the method write-up just mentioned. Document control should also be established for these calibration procedures to inform agency personnel of any changes. As an agency policy, traceability of the accuracy of working calibration standards should be established by comparing these standards to standards of higher accuracy whenever standards of higher accuracy are available.

- Internal Quality Control Procedures

The procedures used during sampling and analysis to detect, correct, and record out-of-control conditions should be defined and documented. Use of control charts is encouraged.

- Audit Procedures

Procedures should be selected and implemented that will permit comparison of the performance of the measurement system (sampling and analysis) under routine operation versus an independent technique. Commonly, this independent technique is either a performance audit or the use of a dual measurement system. Results from these audit procedures are useful in detecting bias in the routine measurement system.

- Interlaboratory Testing

Each agency and its contractors conducting monitoring activities should participate in the EPA quality assurance performance surveys. Requests for participation should be made at the EPA Regional Office.

Develop Within Twelve Months

- Data Validation Procedures

The criteria used to validate air monitoring data should be documented and the routine tests or checks on the raw data should be defined.

- Preventive Maintenance

By measurement method, a schedule for preventive maintenance should be prepared that identifies the maintenance tasks and frequency required. A history of items requiring maintenance or guidance from instrument vendors are useful in developing this schedule. A procedure for performing the maintenance task should be prepared if none is available.

- Review of Training Needs

Proper training of staff members is essential for the performance of their assigned job responsibility. During the first twelve months, the training and experience of all staff members should be reviewed and plans made to obtain needed training.

SUMMARY OF RECOMMENDATIONS

- Comprehensive quality assurance programs should be implemented by October 1978 for those agencies not having such programs.
- Agencies currently implementing quality assurance programs should continuously review and evaluate their existing programs.
- EPA Headquarters should continue and expand its program in developing the technical basis for quality assurance programs.
- Regional Offices should maintain and strengthen their technical capabilities with respect to air pollution monitoring.
- EPA should perform a survey to determine the number and age of air monitoring instruments currently in use in State and local agencies by measurement principle and pollutant. Based on the survey results, a testing program should be implemented to determine whether those instruments in most widespread use meet the performance specifications and other applicable requirements of 40 CFR 53 (Reference and Equivalency Regulation). Testing results should be made available to State and local agencies in sufficient time to minimize any disruptions to their programs while complying with the regulations requiring State and local agencies to use only reference or equivalent instrumentation after February 1980.

CHAPTER VII

ANALYSIS AND INTERPRETATION OF AIR QUALITY INFORMATION

The purpose of this chapter is to present two separate but related themes involving the analysis, interpretation, and display of air quality information. These themes may be simply stated as follows: (1) the complexities of air quality management will require a more sophisticated approach to data analysis and evaluation than that which has been followed traditionally to support abatement and control programs; further, (2) EPA and the State and local agencies must devote additional effort to displaying and publicly reporting timely and meaningful air quality information.

DATA ANALYSIS AND EVALUATION

The first of these themes may be illustrated by way of several examples in which data analysis impinges directly on air program abatement and control activities. These examples indicate a growing need for more thoughtful and competent analysis of air monitoring data.

The first example comes from recent efforts by governmental agencies and the private sector to clarify the relationship between oxidants and precursor hydrocarbon and nitrogen oxide emissions. In one such effort, Bell Laboratories used "robust" statistical procedures to demonstrate the extent of oxidant transport through the Northeast corridor from New York City to Boston, Massachusetts. This analysis was based on data obtained from the ground station network of oxidant monitors now operated by the States. Bell's analysis demonstrated that highest oxidant peaks were associated with southwesterly air flows which transport precursor emissions from high emission density areas of New York towards Connecticut and Massachusetts. Preliminary EPA analyses of these data indicate a possible difference between weekdays and weekends with respect to the distance downwind where highest oxidant levels occur. EPA is now conducting further analyses to determine if the differences are statistically significant and to what extent they can be explained in terms of the difference between emission patterns prevailing on weekdays and weekends.

In a parallel effort, EPA is devoting considerable time and effort to the analysis of ambient and chamber oxidant data. The purpose of this effort is to provide better technical guidance to the States for the development of oxidant control strategies. This analysis combines the results of state-of-the-art photochemical oxidant diffusion modeling and empirical analysis of ambient data to derive a closer approximation of the process that is believed to occur in the ambient air. Although this and many similar efforts are in the nature of research, it is extremely likely that similar efforts will be required by the States and local agencies in the future to determine the most realistic and practical means of attaining the oxidant standard.

A second example of the increasing importance of data analysis is to be found in the interpretation of peak concentrations in relationship to short-term ambient standards. The conventional approaches for describing pollutant concentration data in terms of a single probability distribution function is not uniformly accepted nor applicable for all source pollutant configurations. There appears to be a need for additional evaluation of air quality data to develop guidance which addresses the adequacy of distribution functions in estimating peak concentrations in cases where intermittent sampling is being done. A uniform procedure for estimating peak concentration is especially important for EPA's regional offices and State and local agencies in revising SIP's, reviewing variance requests, and in reviewing new sources. A procedure is also needed to develop statistical error bands on estimates of peak concentration and for evaluating these uncertainties in relationship to concentration variations caused by annual and seasonal meteorolcgical fluctuations.

A third example area where data analysis has an increasingly important program application is the evaluation of air quality trends. Trends are important indicators of the rate of improvement of air quality, and provide a convenient check on the adequacy of emission reductions to achieve the standards. Such evaluations are complicated by annual and seasonal variations in meteorological conditions which can lead to false impressions as to the relative rate of progress or deterioration. Procedures to "account" for meteorological influences are just being developed and must be tested before their routine application in air quality trend analysis can begin. For some pollutants, notably oxidants, approximately 5 or more years of data at a single monitoring site are apparrently necessary before any meaningful trend can be detected. Better techniques are necessary to sharpen the analysts' ability to detect "subtle" impacts of gradual emission changes on oxidant air quality.

The last example area concerns the use of pollutant roses to evaluate the impact of specific sources or source categories. Although tabulation of data in the format of pollutant roses is a relatively simple and straightforward task, the procedure is highly effective for illustrating and quantifying the contribution of source emissions on ground-level ambient concentrations. Pollutant roses are also useful for evaluating trends, especially in situations where air quality at a particular monitoring site is dominated by a local source.

These four examples are no more than a limited sample of the kinds of anlaysis which should become an integral part of a total air pollution control program. There are no reliable guides available for determining the exact needs of the State and local agencies for data analysis. The Work Group recommends that EPA establish such guidelines and that they be used in determining the minimum level of resources necessary for data analysis activity.

AIR QUALITY DISPLAY AND REPORTING

SAMWG observes that air quality monitoring information presented in a geographical or spatial context is useful to air pollution agencies and highly informative for the public. Using such an approach, in which pollutant concentration isopleths are shown for a specific area, it is possible to emphasize a broader geographical scale than that which is generally associated with a single monitoring station. In this context, geographically oriented air quality presentations supplement conventional tabulations of air quality summary statistics. Portrayal of air quality in the form of concentration isopleths is an extremely effective technique for providing:

- A "visual" perspective of the spatial and geographical variations in air quality and patterns of population exposure;
- A meaningful reference for evaluating air quality trends in relation to temporal and spatial emission trends; and,
- A spatially representative baseline of air quality for evaluating and modifying regulatory programs (e.g., SIP's, new source reviews, attainment decisions).

SAMWG recognizes that isopleth display techniques are not new and, in fact, have been used in the past by EPA and some State and local agencies. SAMWG is calling attention to these techniques now to foster their increased use by air pollution control agencies for pollutants for which these techniques are most suitable.

Basically, there are two approaches to generating the necessary air quality information: (1) using data from an existing network, and (2) using an air quality diffusion model.

The first approach requires data from a reasonably "dense" air monitoring network. The adequacy of the network in terms of its size or "density" is largely determined by the known or suspected air quality gradients. Areas in which air quality changes slowly across the region of interest would require fewer stations.

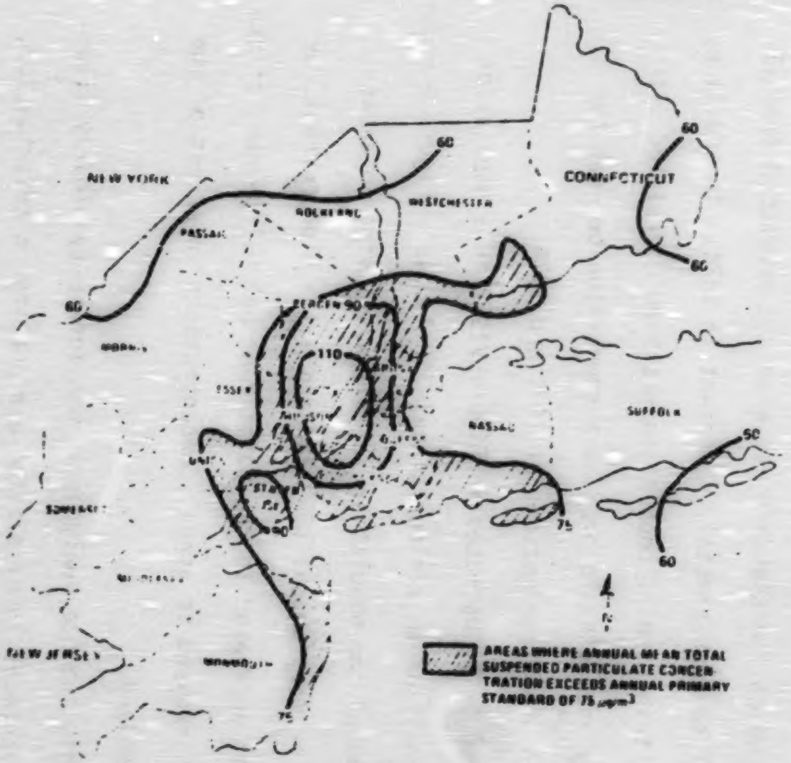
To clarify the concept, an example of the application of the technique is illustrated in Figures VII-1 and 2. The New York City area was chosen to illustrate the technique since a rather large TSP network has been in operation there for some time.

Figure VII-1 shows TSP isopleths based on spatial interpolations of annual average concentrations obtained from the existing air monitoring network in the New York City metropolitan area. In this example, it is clear that highest annual average TSP concentrations are centered over the metropolitan core of New York City. Obviously, in 1971 large portions of the area were subject to annual averages in excess of the Federal ambient standard. It is also clear from this figure that a significant improvement in air quality occurred between 1971 and 1974. In this example, the land area over which the standard was exceeded decreased from 19 percent in 1971 to approximately 4 percent in 1974. In addition, the spatial distribution of population has been correlated with the air quality isopleths to produce a comparison between the population exposure distributions of 1971 and 1974.

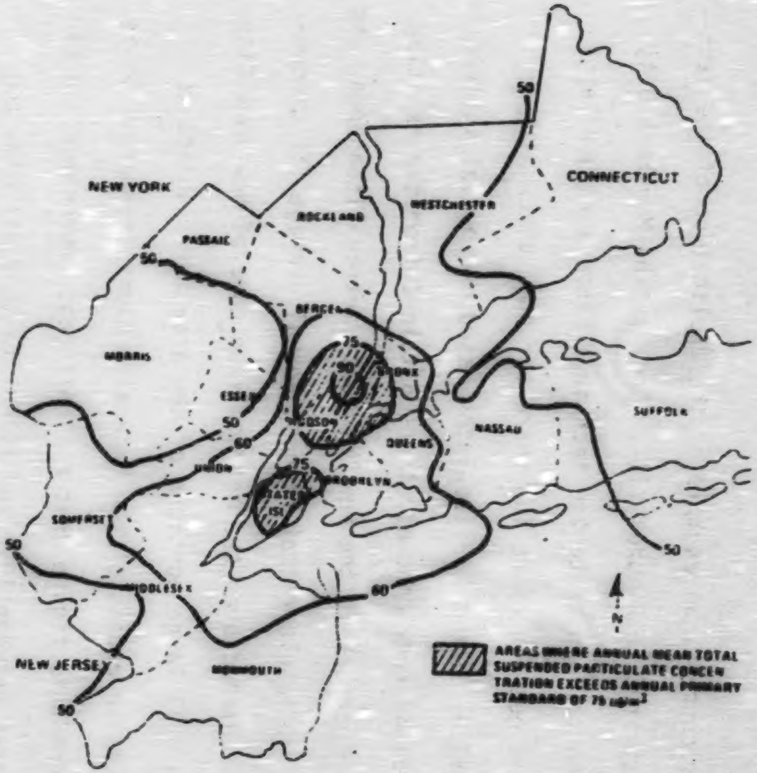
This trend is illustrated in Figure VII-2 in a population exposure distribution to various annual TSP levels. Figure 2 shows that 58 percent of the population in 1971 was living in areas exceeding the primary annual TSP standard while, in contrast, by 1974 levels had decreased to the point that only 17 percent of the population was exposed to annual concentrations in excess of the annual TSP standard.

While this example analysis in New York City clearly illustrates the advantages in displaying air quality in this fashion,

FIGURE VII-1
ISOPLETHS OF ANNUAL AVERAGE TSP CONCENTRATIONS FOR THE NEW YORK, NEW JERSEY, CONNECTICUT AQCR IN 1971 AND 1974


NEW YORK
CONNECTICUT
PASSAIC
ROCKLAND
WESTCHESTER
BERGEN
MORRIS
ESSEX
NASSAU
SUFFOLK
SOMERSET
MIDDLESEX
MONMOUTH
NEW JERSEY
STATEN ISL
N
60
90
110
75
50
AREAS WHERE ANNUAL MEAN TOTAL SUSPENDED PARTICULATE CONCENTRATION EXCEEDS ANNUAL PRIMARY STANDARD OF 75 μg/m³

Isopleths of annual geometric mean concentrations of total suspended particulate in 1971.

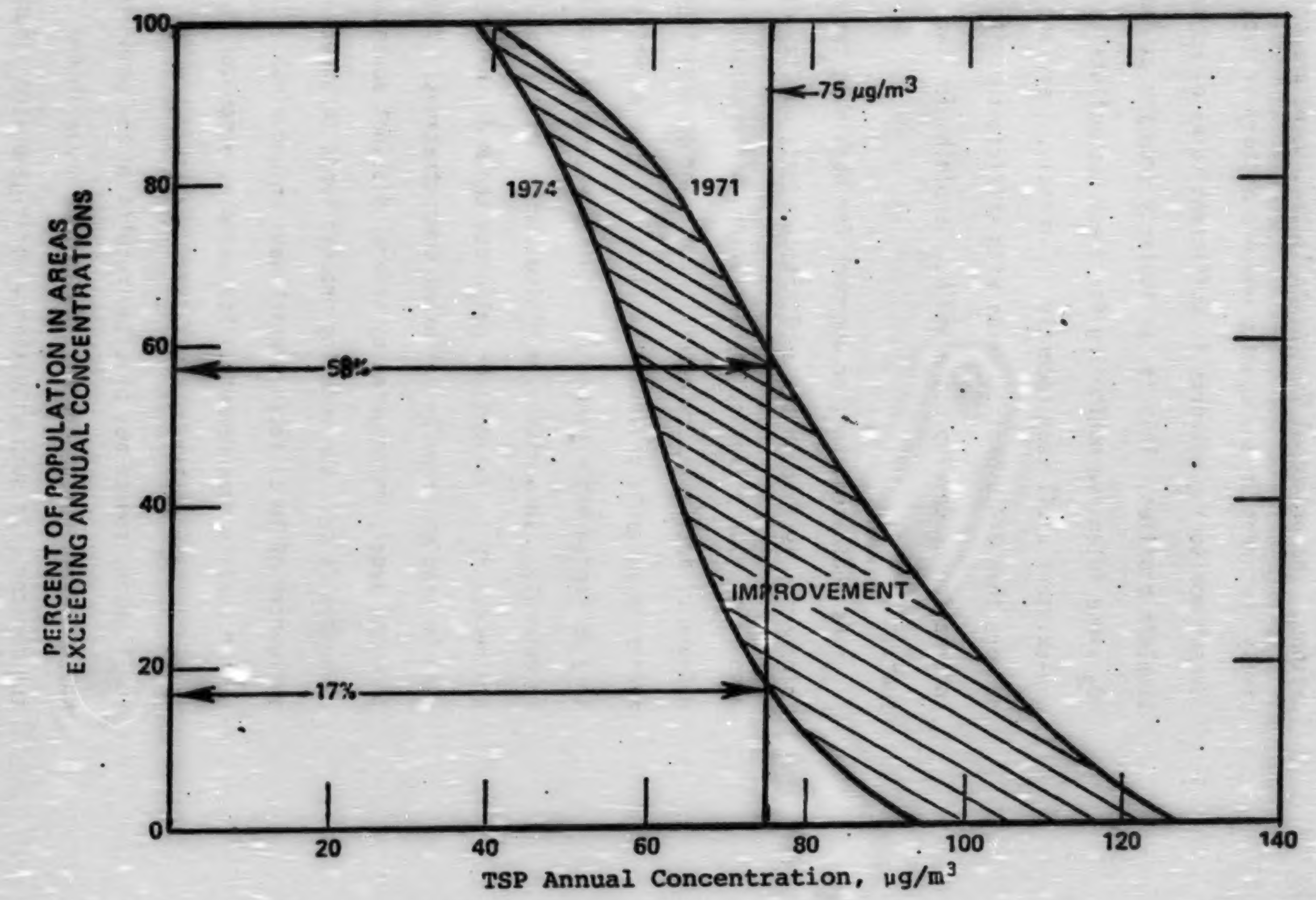

NEW YORK
CONNECTICUT
PASSAIC
ROCKLAND
WESTCHESTER
BERGEN
MORRIS
ESSEX
HUDSON
BRONX
QUEENS
NASSAU
SUFFOLK
UNION
BROOKLYN
STATEN ISL
SOMERSET
MIDDLESEX
MONMOUTH
NEW JERSEY
N
50
60
75
90
AREAS WHERE ANNUAL MEAN TOTAL SUSPENDED PARTICULATE CONCENTRATION EXCEEDS ANNUAL PRIMARY STANDARD OF 75 μg/m³

Isopleths of annual geometric mean concentrations of total suspended particulate in 1974.

NOTE: ISOPLETH MAPS ARE BASED ON SPATIAL INTERPOLATION FROM DATA MEASURED AT 103 MONITORING SITES. LOCAL TSP MAY VARY BECAUSE OF METEOROLOGY, TOPOGRAPHY, AND EMISSIONS.

FIGURE VII-2

POPULATION EXPOSED TO ANNUAL TSP
(NY, NJ, CONN AQCR)



there are limitations which restrict broad-scale national applications. The principal limitation is that there are only relatively few areas in the country where a history of data from "dense" monitoring networks is sufficient to allow accurate isopleth profiles. This is particularly true for oxidants and NO_2 since intensive monitoring for these two pollutants has been non-existent until very recently. Currently, there are probably no more than 2-4 urbanized areas with sufficient monitoring information to develop ozone and NO_2 isopleths for two or more years.

As indicated, another approach for obtaining the necessary information is through the application of air quality diffusion models in which pollutant concentrations are estimated for a dense network of artificial receptors. The major disadvantage in using models to estimate pollutant isopleths is that an emission inventory is needed which generally requires extensive time and manpower to generate. In addition, a minimum amount of air quality data are necessary to validate or calibrate the model before it can be used to predict areawide pollutant concentrations. This disadvantage is largely compensated by several distinct advantages. One advantage is that the modeling process tends to smooth out the influences of local factors which have an undesirable local effect on air quality measurements. For example, a monitor located so as to reflect air quality which is affected disproportionately by a small nearby source may bias the results to the point that they may not represent an appropriate ambient scale in the vicinity of the monitor. In such situations, model-generated isopleths are more representative of ambient air quality than those generated from inappropriate monitoring stations. Another important advantage in using a model to develop air quality isopleth displays is that the model can be used to predict concentrations at any geographical point in the area of concern. This is especially important in areas where a limited number of monitors are in operation.

Diffusion models which have been developed for TSP and SO_2 are widely accepted for predicting pollutant concentrations under most topographical and meteorological circumstances. At present, no satisfactory models exist for routine use in predicting area-wide concentrations of oxidants and NO_2, primarily because of the enormous complexity of the task of accurately simulating the chemical reactions of precursor pollutants emitted into a dynamic and turbulent atmospheric environment. Current air quality models for CO are reasonably adequate for simulating large-scale (1/2 to 2 km) ambient levels, but are not presently adequate to accurately estimate CO concentrations occurring in confined areas of high emission density such as in street canyons, near intersections, and the like.

Future efforts on the part of the state and local agencies to develop maintenance plans, review and modify SIP's, and conduct new source reviews will require the use of diffusion models. Much of the use of models in the future will be geared to long-range air quality planning since air quality continues to respond to emission reductions designed to attain NAAQS. Modeling to support the development of air quality maintenance plans will result in isopleth displays of air quality for areas for which additional controls must be evaluated. In this manner, model-generated isopleths enable a planner to project the areawide air quality effects of new growth patterns. In particular, the significance of a potential new source can be evaluated in terms of its likely air quality impact.

SAMWG believes that in cases where modeling is required, strong consideration should be given to the desirability of displaying areawide air quality patterns and trends. In cases where modeling activities are not planned, existing monitoring networks should be evaluated to determine whether adequate concentration isopleth displays can be appropriately developed.

SAMWG has established that a goal of the monitoring strategy is the development of isopleth concentration displays for large metropolitan areas, especially those having an urbanized population exceeding 1,000,000. The selection of areas should be determined by a number of factors including (1) adequacy of the monitoring base; (2) the nature of the pollutant problem (e.g., fugitive dust versus industrial); (3) the resources available ; and (4) the practicability of using diffusion models in cases where their use is necessary for an adequate areawide air quality display. These air quality displays should be developed and updated annually by State and local agencies using either actual monitoring data, air quality diffusion models, or a combination of both. For at least a defined subset of these areas, isopleth displays should be estimated for an appropriate base year (e.g., 1970) to enable control agencies to portray trends in air quality and population exposure.

The precise areas and schedules under which the State and local agencies would accomplish this would be decided through joint consultations between the States and regional offices during the formal program planning process. SAMWG also recommends that EPA develop a technical guideline document for use by the State and local agencies in developing isopleth concentration displays. The guideline should prescribe the procedures, estimation techniques, and input information requirements which produce satisfactory displays.

In addition to public-oriented presentations of air quality data, SAMWG feels that the public should be kept informed of day-to-day changes in air quality. EPA's Pollutant Standards Index (PSI) is suggested for use on a voluntary basis by State and local air pollution control agencies wishing to use an index approach for reporting ambient air quality. The PSI transforms daily concentrations of the criteria pollutants into a uniform scale ranging in severity from 0 to 500, where 0 to 50 is "good," 50 to 100 "moderate," 100 to 200 "unhealthful,' 200 to 300 "very unhealthful," and greater than 300 "hazardous." The index provides the public with appropriate generalized health effects and cautionary statements.

As a concluding observation, SAMWG believes that EPA should take a more active research role in determining the usefulness of personal air pollution samplers to measure the exposure dose to representative individuals. Increasingly, air pollution control agencies are being challenged on the use of fixed station ambient monitors to support regulatory activities. Challengers point to limited studies which show that fixed station data have no direct relationship to exposures actually received by a mobile population. Thus, they argue that SIP's based on fixed station monitors can be overly lax, or conversely, too restrictive in terms of emission controls needed to achieve ambient air quality standards. These assertions could be objectively tested if personal monitoring devices could be used to establish relationships between personal exposure and concentration patterns at fixed monitoring locations. Hopefully, such relationships could be used to calibrate or adjust fixed station data to more adequately represent actual exposure received by certain sensitive population groups.

SUMMARY OF RECOMMENDATIONS

- EPA should determine the minimum data analysis capabilities needed by air pollution control agencies in order to properly interpret and distribute monitoring information. These minimum capabilities should be used as guides by EPA and control agencies in assessing needs for resources for data analysis.
- Isopleth concentration displays should be developed and kept current for selected metropolitan areas having large populations (e.g., exceeding 1,000,000). Where practicable, such displays should also be made of baseline (e.g., 1970) air quality in order to present trends graphically.

- EPA should develop a guideline document dealing with isopleth concentration displays.
- Control agencies are encouraged to use EPA's Pollutant Standards Index (PSI) to inform the public of day-to-day changes in air quality.
- EPA should initiate research to determine the feasibility of using personal monitors to measure the exposure dose to representative individuals.

CHAPTER VIII

ANTICIPATED IMPACT OF STRATEGY

INTRODUCTION

Expenditures for air pollution control of State and local agencies are shown in Table VIII-1. In FY1976, nearly 150 million dollars was spent, of which nearly 30 million (or 20 percent) was devoted to ambient air monitoring activities. Total spending increased by 4.6 percent over FY1975, compared to an increase of 16.4 percent in resources for air monitoring. The greater increase in air monitoring resources in FY1976 as compared to total agency resources is attributed to increased quality assurance activities and special monitoring studies. Although quality assurance activities of State and local agencies have increased slightly, this increase is in many cases insufficient to implement adequate programs at all levels where monitoring is conducted.

Table VIII-2 shows a breakdown of resources expended for ambient and source monitoring activities in FY1975. This shows that nearly 18 million dollars was spent in FY1975 on source monitoring activities, which includes emission inventories, source testing, and special source monitoring activities.

OVERALL IMPACT OF MONITORING STRATEGY

It is anticipated that the resources associated with air pollution control activities in general and air monitoring activities in particular will not change substantially in the near future. Thus, SAMWG's attention has been directed to the reallocation of the total resources available for monitoring so that they will be used more effectively. As an example, resources

TABLE VIII-1

STATE AND LOCAL CONTROL AGENCY
EXPENDITURES ON AIR POLLUTION CONTROL ACTIVITIES

Source	FY1975 (000's)	FY1976	% Change
Federal	$51,900	$55,300	+6.6
Non-Federal	$91,200	$94,400	+3.5
TOTAL	$143,100	$149,700	+4.6
Ambient Air Monitoring	28,600*	33,300	+16.4

*FY-1975 estimates for ambient air monitoring resources shown in Table VIII-2 also include EPA expenditures and thus the total is higher.

TABLE VIII-2
STATE, LOCAL AND FEDERAL EXPENDITURES ON AIR MONITORING ACTIVITIES, FY1975

Ambient Air	$ (000's)	Source	$ (000's)
SIP Networks	23,900	Emission Inventories	6,600
Special Purpose Monitoring	4,500	Source Testing[b]	8,400
Quality Assurance[a]	3,300	Special Studies	2,700
TOTAL	31,700*	TOTAL	17,700

[a] Quality assurance activities apply to both source and ambient.

[b] About 85% is used for enforcement purposes.

*FY-1975 estimates for ambient air monitoring resources shown in Table VIII-1 does not include EPA expenditures and thus the total is lower.

saved on reduction in the operation of tape sampler networks could be used for increased quality assurance activities or for additional special purpose monitoring, including analysis and reporting of data in non-attainment areas. Table VIII-3 provides a qualitative picture of how monitoring resources might be affected by the monitoring strategy on a national basis.

In the area of data handling, for example, it is expected that resources needed at the Regional Office level will increase. Additional resources may be needed by some RO's since the strategy will involve new or additional responsibilities in the area of data storage and retrieval of SLAMS data. It is anticipated that the greatest increase in resources will be needed during the implementation phase of the strategy in order to develop new operations in those Regions who elect to store SLAMS data. Once underway, these programs should not call for substantial added resources for maintenance. However, it is recognized that in many areas, additional resources will be needed to implement a fully operational quality assurance program. Further, purchase of new continuous type instruments to complete the NAQTS network or to replace obsolete instrumentation will require additional resource committments. SAMWG recommends that new resources be made available for these purposes from Federal, State and local sources.

RESOURCES FOR AMBIENT AIR MONITORING

Impact of NAQTS Strategy

Estimates were made of resources needed for operation of the National Air Quality Trend Station (NAQTS) network. (This

TABLE VIII-3

ESTIMATED NATIONAL RESOURCE IMPACT OF SAMWG STRATEGY[a]

Element	EPA Headquarters	EPA Regional Office	State Agencies	Local Agencies
NAQTS				
Sampling & Lab. Analysis	Same	Same	Decrease[c]	Decrease[c]
Data Reporting	Same[b]	Decrease	Decrease	Decrease
SLAMS				
Sampling & Lab. Analysis	N/A	Same	Increase	Increase
Data Reporting	Same[b]	Increase	Increase	Increase
SPM				
Sampling & Lab. Analysis	Increase	Increase	Increase	Increase
Data Reporting	Same[b]	Increase	Increase	Increase
Non-Criteria				
Sampling & Lab. Analysis	Increase	Increase	Increase	Increase
Data Reporting	Increase	Increase	Increase	Increase
Data Analysis and Interpretation (inlcuding modeling)	Increase	Increase	Increase	Increase
Quality Assurance	Increase	Increase	Increase	Increase
Emission Inventories	Same	Same	Increase	Increase
Source Testing	Same	Same	Increase	Increase

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[a] Table indicates changes expected nationally over the next five years in relation to current expenditures. Individual State or local agency impact may deviate from the national average.

[b] Increases in CDHS activities and clearinghouses will roughly balance out any savings in handling a reduced national air quality data base.

[c] Some agencies may experience temporary increases due to the need to replace unapproved instrumentation.

N/A - Not applicable.

network is discussed in detail in Chapter III.) The resource estimates include operation of equipment, analysis of samples, quality assurance and supervision.

Table VIII-4 presents current resource estimates for the NAQTS network in comparison to the Federal minimum requirements under 40 CFR 51.17 and existing State and local networks.

There are several noteworthy points to be made concerning TABLE VIII-4. First, the resources allocated to each pollutant monitoring program should not be taken to imply the relative importance of the pollutant or the monitoring program. For example, the fact that more resources are needed for O_3 NAQTS than for CO NAQTS does not necessarily mean that the O_3 air quality management program is more important or more difficult. It reflects the relative cost of the monitoring devices and number of devices needed in each geographical area in order to provide a sufficient trend data base to satisfy EPA Headquarters needs.

Second, the reader should not infer that the establishment of NAQTS will automatically result in a reduction in ambient trend monitoring activities and associated monitoring resources. That is, if the NAQTS strategy becomes the new Federal minimum requirement for EPA HQ data needs, a resource savings of $8.0 million (14.7 minus 6.7) will not necessarily result. This is due to the fact that the NAQTS represents a fraction of the total monitoring effort necessary on a national basis. The SLAMS network and SPM projects will continue to provide the bulk of data necessary to support SIP control actions. However, it is hoped that during the establishment of the NAQTS, the State and local agencies will

TABLE VIII-4

CURRENT RESOURCE ESTIMATES[a] FOR OPERATION OF NATIONAL AIR QUALITY TREND STATIONS (NAQTS) AND STATE/LOCAL AIR MONITORING STATIONS (SLAMS)

MILLIONS OF DOLLARS

Pollutant	SLAMS Strategy	NAQTS Strategy	Federal Minimum Requirements (40 CFR51.17)	Existing State & Local Networks
TSP				
Hi-Vols	2.5 - 3.1	0.9	1.7	4.3
Tape Samplers	0.2 - 0.4	b	2.9	2.2
SO_2	4.2 - 6.7	2.3	6.5	10.7
CO	2.2	1.1	1.1	3.3
O_3	2.0	1.4	1.4	3.4
NO_2	1.8 - 2.9	1.0	1.1	4.7
TOTAL	12.9-17.3	6.7	14.7	28.6

[a] The costs include: capital costs for purchase amortized over a five year period and annual costs which include quality assurance, data handling, operation of instrument, maintenance and supplies, and supervision.

[b] Tape samplers are not included in the NAQTS strategy. They may be used for TSP emergency episode prevention and thus should be included in the SLAMS network.

critically review the need for each of their fixed monitoring stations and eliminate those that are unnecessary.

Impact of SLAMS Strategy

In addition to the NAQTS network, the State and local agencies will be performing additional fixed station monitoring (State and local air monitoring stations) in support of SIP activities. The amount of SLAMS type monitoring will vary from place to place depending on the need for air quality information. Therefore, it is not possible to present definitive resource estimates for this monitoring category until the States have completed an analysis of their monitoring activities in conjunction with the appropriate EPA Regional Offices. However, a rough estimate of resources for SLAMS activities has been made, and is shown in Table VIII-4.

Impact of Special Purpose Monitoring (SPM)

Current special purpose monitoring resource estimates have been estimated to be around 4.5 million dollars for FY1976. This total should increase as a result of SAMWG's increased emphasis on special purpose monitoring. It is expected, however, that the total resource available for air monitoring will remain the same or perhaps increase slightly. Thus, the total expenditures for SLAMS and SPM will be the difference between the total monitoring resource and that required for NAQTS. It is SAMWG's estimate that most of this difference will be placed into SLAMS monitoring over the next few years, with SPM monitoring perhaps increasing slightly. As air quality approaches standards, the need for SPM will increase in order to provide more specific information about why standards are not being attained. However, if new air quality standards are established, there may be needs for additional monitoring of the type done with NAQTS and SLAMS.

Resources for Source Monitoring

SAMWG estimates that resources for source monitoring should not change significantly as a result of the strategy. Overall resources needed for emission inventory activities may increase slightly. Since data will be reported less often for many areas, expenditures should decline. However, there will be a need for increased inventory activity and associated resources for fugitive emissions sources and hydrocarbon sources. Also, there will be increased resource requirements in areas where dispersion models are necessary.

Few changes in source testing activities have been recommended by SAMWG. Thus, there should be no significant change in the resources being expended in this monitoring strategy. However, continuing activities in the area of NSPS will result in a need for additional resources as new industrial categores are regulated. These resources will be needed for stack sampling and continuous in-stack monitoring by affected sources.

Expected Benefits of the Air Monitoring Strategy

The benefits to be expected from implementation of the proposed monitoring strategy are summarized in Table VIII-5 through VIII-8 for each of four principal data uses. For example, under the use "judge attainment of NAAQS" the three strategy components outlined above are cross tabulated with areas for which attainment decisions are of greatest general concern. Note that establishment of trend sites (both NAQTS and SLAMS) meets most of the data needs to judge attainment of NAAQS in urban areas but does not meet these needs around point sources. To make adequate attainment judgments around major point sources, additional resources may be needed for special purpose monitoring and modeling. The appropriate mix of resources to be used for the three strategy components will depend on source size, the applicability of models for the particular source-pollutant configuration, and the extent of available monitoring resources.

The proper use of the three strategy components will result in an overall monitoring strategy capable of meeting the principal uses of monitoring data.

TABLE VIII-5

DATA USE: JUDGE ATTAINMENT OF NAAQS

STRATEGY COMPONENT	MEETS DATA USE/COMMENT		
	URBAN	POINT SOURCES	MAX CONC. AREAS
Fixed Station Monitoring (FSM)	YES. high quality data from FSM* suitable for areawide NAAQS judgments	NO. will require special purpose and movable monitoring in conjunction w. modeling	PARTIALLY. the FSM* are generally located in max concentration areas. Local "hot spots" must be identified w. movable monitors
Special Purpose Monitoring (SPM)	PARTIAL. Special Purpose monitors will supplement FSM* and NAAQS attainment judgments in local areas	YES. SPM monitors will be used to calibrate models & establish NAAQS violations. Special purpose fixed stations (e.g. SCS) will also suffice for some sources	PARTIALLY. SPM monitors will be used to identify "hot spots" & establish fixed stations as needed
Air Quality Modeling (AQM)	OPTIONAL. Can be used to identify areal extent of air quality problem in selected areas	PARTIALLY. Models, where appropriate, will be used to identify areas around sources above NAAQS needing monitors	PARTIALLY. Models will be used to augment movable monitors and FSM* to locate stations in "hot spots"
Net Impact of Strategy to Judge Attainment of NAAQS	YES. Data from FSM* augmented by SPM & AQM as needed	YES. Primarily based on AQM & SPM Special purpose fixed station networks (e.g. SCS) will suffice in some cases	YES. Combination of data from FSM*, SPM & AQM

FSM includes National Air Quality Trend Sites (NAQTS) and State and Local Air Monitoring Sites (SLAMS)

TABLE VIII-6
DATA USE: REVISE SIP CONTROL STRATEGIES

STRATEGY COMPONENT	MEETS DATA USE/COMMENT		
	URBAN	POINT SOURCES	MAX CONC. AREAS
Fixed Station Monitoring (FSM)	YES. The FSM* will be primary base of high quality data for SIP revisions	NO. Point source oriented SIP revisions will be based more on special purpose networks, movable monitors, supplemented by modeling	PARTIALLY. The FSM* are generally located in max concentration areas & are critical in SIP revisions
Special Purpose Monitoring (SPM)	YES. SPM monitors likely to play vital role to validate extent of air quality problem, determine specific source impact, etc.	YES. SPM monitors will be key to success of SIP revisions, esp. around isolated point sources. Also needed to validate point source models required for SIP revisions	PARTIALLY. SPM monitors will be required to document air quality "hot spots" and determine sources & conditions causing max concentrations
Air Quality Modeling (AQM)	OPTIONAL. In some urban areas, modeling will be used to define sources needing additional control	YES. Point source modeling, where appropriate, will be basis of projected air quality impacts & emission control strategies	YES. Revisions to SIP's will rely on use of air quality modeling to insure "hot spots" are adequately controlled
Net Impact of Strategy to Revise SIP Control Strategies	YES. Combination of FSM*, SPM and modeling will suffice for SIP revisions in urban areas	YES. Combined use of SPM and modeling will suffice for SIP revisions for individual point sources	YES. Combined use of modeling and data from SPM will suffice to insure adequate controls of "hot spots"

*FSM includes NAMS and SLAMS monitoring

TABLE VIII-7

DATA USE: AIR QUALITY PROGRESS AND TRENDS

STRATEGY COMPONENT	MEETS DATA USE/COMMENTS				
	URBAN	POINT SOURCE	MAX. CONC.	ESTIMATE POPULATION EXPOSURE	BACKGROUND
Fixed Station Monitoring (FSM)	YES. [illegible]awide air qual[illegible] trends	NO. Requires special-purpose fixed stations	PARTIALLY. Must supplement FSM* with SPM	PARTIALLY. Must supplement FSM* with SPM & areawide models	PARTIALLY. Few FSM* monitors in background areas must be supplemented by SPM & models
Special Purpose Monitoring (SPM)	NO. [illegible] primary deter[illegible]d by FSM*	YES. Requires combination of special purpose monitors & modeling	PARTIALLY. Used to spot check high growth areas to establish FSM*	PARTIALLY. To supplement FSM* and establish concentrations in unmonitored areas	PARTIALLY. Combined with FSM* stations to estimate background levels
Air Quality Modeling (AQM)	OPTIONAL. Can be used to augment FSM & to project areawide air quality programs	YES. Will be used to assess point source emission/air quality improvements	YES. Models calibrated with FSM and SPM to project maximum concentration improvements	YES. Used with FSM for calibration of areawide models to estimate trends in population exposure.	PARTIALLY. Expected and actual air quality trends in background concentrations based on emission growth and models
Net Impact of Strategy to Evaluate Air Quality Progress and Trends	YES. Data from FSM supplemented by AQM	YES. Data from AQM AND SPM	YES. Data from AQM supplemented from FSM and SPM	YES. Data from AQM supplemented with data from FSM & SPM	YES. Combination of data from FSM, SPM, and AQM

*FSM includes NAQTS and SLAMS

TABLE VIII-8

DATA USE: NEW SOURCE REVIEW/PREVENT SIGNIFICANT DETERIORATION

STRATEGY COMPONENT	MEETS DATA USE/COMMENT	
	BASELINE AIR QUALITY	PROJECT AIR QUALITY INCREMENTS
Fixed Station Monitoring (FSM)	PARTIALLY. Portions of the FSM* network will be useful to estimate baseline air quality in areas experiencing growth or expecting new sources	NO. The FSM* will be useful, however, in validation of models needed to project air quality increments
Special Purpose Monitoring (SPM)	PARTIALLY. New sources may be required to document baseline air quality before construction. SPM will augment baseline data	NO. SPM will be also used to validate models used in air quality projections
Air Quality Modeling (AQM)	PARTIALLY. Modeling will be required for areas where baseline data are insufficient or not appropriately obtained otherwise	YES. Modeling or rollback will be necessary to estimate growth and new source air quality impacts
Net Impact of Strategy to Review New Sources/ Prevent Significant Deterioration	YES. Combination of all 3 strategy components depending on source size, availability of data, etc.	YES. Validated models will be principal tool for projecting air quality increments

*FSM includes NAQTS & SLAMS

CHAPTER IX

IMPLEMENTATION OF STRATEGY

INTRODUCTION

In developing the strategy proposed in the preceding chapter, the members of the Standing Air Monitoring Work Group (SAMWG) proceeded on the premise that the current air monitoring program is performing reasonably well and constitutes a sound base from which to improve its responsiveness and cost-effectiveness. Accordingly, the resultant strategy is designed to build upon this framework in an evolutionary manner rather than to force major changes to be implemented abruptly. Implementation of all of the new or revised activities called for, or implied by, the strategy cannot be accomplished quickly. The critical role of monitoring within the Air Program dictates that any substantial change be carefully planned and managed. To do otherwise, entails the risk of decreasing the effectiveness of other activities dependent upon monitoring. Due to these considerations, SAMWG recommends that this strategy serve as a blueprint for change over a five-year period starting in fiscal year 1978. By phasing the strategy in over five years, control agencies should have sufficient time to carefully plan the technical changes involved and in most cases will have sufficient time to program for the resource adjustments required. Comments offered at the four air monitoring workshops held in January 1977 indicated that some agencies foresee fairly severe resource limitations for the next five years. Others indicated that while they did not foresee severe resource limitations, they felt that the strategy called for too many of the action items to be accomplished during the first two years of the implementation period. They felt that the strategy should allow each agency to have a greater say in planning the pace and sequence of particular items in the strategy based upon their respective needs, capabilities, and resources. As a result of these comments, SAMWG reconsidered its proposed implementation schedule and revised its expectations about implementation to provide more State and local flexibility. Due to the importance of quality assurance, SAMWG reaffirmed its recommendation to implement the quality assurance program during the first 12 months. SAMWG has lengthened the implementation period for the major ambient recommendations to provide one- to three-year implementation schedule. SAMWG felt that changes to the ambient monitoring program were the most critical and should thus receive the highest priority effort during the initial 1-3 years of the implementation period. Action items dealing with other areas of the strategy will generally be implemented over a longer period of time.

In view of the need to provide some overall guidance and structure for the implementation of this strategy, SAMWG foresees that EPA's Annual Program Guidance (prepared prior to the start of each fiscal year) will serve as a vehicle for focusing effort on the objectives to be stressed during the next fiscal year. This Annual Guidance will include strategy objectives for the EPA regional offices (RO's) and for particular EPA headquarters components. In preparing their annual program plans, all EPA offices are expected to commit themselves to the accomplishment of as many of these desired objectives as are possible within their resources. Necessarily, many of the regional office air monitoring objectives will require action by State and/or local agencies. For FY-1978, SAMWG has recommended that the States develop plans and schedules for implementing SAMWG's major recommendations pertaining to ambient monitoring activities.

As outlined under the first major section in Table IX-1, these plans will encompass a broad range of activities, many of which are critical to assessing NAAQS attainment and maintenance. SAMWG recommends that the RO's take an active role in assisting State and local agencies with such plans, particularly in regard to planning the respective roles of the RO's and State and local agencies in storing, reporting, and analyzing ambient data in the future. The plans to be prepared early in FY-1978 will serve to structure and document the approach and schedule for the major ambient monitoring changes.

SAMWG recognizes that the specific milestones contained in these initial plans may have to be modified in the future due to factors such as unforeseen resource constraints and changes in control agency needs and priorities. In addition to playing a cooperative role in planning, the RO's are expected to have an active role in assisting control agencies in program evaluation and in providing technical assistance in new, specialized, or problem areas of air monitoring. In some cases, the EPA RO's may choose to incorporate some part of these objectives as outputs expected under an agency's Control Program Grant. The particular terms and conditions would be negotiated annually by the RO's and the grantee agencies.

In order to refine the objectives to be set forth in each year's Annual Program Guidance, SAMWG recommends that periodic evaluations be performed of the progress achieved in implementing the strategy. Such evaluations should be conducted as a joint effort between the State and local agencies, EPA headquarters, and the RO's, and be as informal as possible with a minimum of special reporting by all parties concerned. While resource limitations will, of course, be a key factor in the process, the dynamic nature of the Air Program and its impact on air monitoring should also be recognized. Over the next five years, most, if not all, State and local agencies will be faced with changing needs for monitoring data. Such changes will arise from changes in present programs, and may well result from future amendments to the Clean Air Act. In addition, the state-of-the-art in air monitoring will presumably be advancing during the period. This will mean that new and improved measurement equipment and techniques will become available and, hopefully, many of the shortcomings in current monitoring methodologies will be resolved. In light of these considerations, SAMWG believes that neither EPA nor the State and local agencies should view the strategy as a set of static requirements for judging progress. Therefore, periodic evaluations should broadly consider all major activities which impact on air monitoring.

IDENTIFICATION OF MAJOR STRATEGY ACTIONS

Chapters III-VII of this document have presented a large number of recommendations. Many of these explicitly identify some new activity or program which should be implemented. A substantial number, however, emerge mainly by implication. As an example of this type, one might cite the need to take a more critical view of special purpose monitoring. It is not the purpose of this chapter to try to restate all of the many activities and tasks already presented. It will attempt to focus on the major actions to be undertaken during the next five years. Table IX-1 presents a summary of these actions with an identification of the organization(s) responsible and the estimated implementation period.

TABLE IX-1 SCHEDULE OF STRATEGY ACTION ITEMS

Action Item	Responsible Organization(s)	Period of Implementation
Ambient Criteria Pollutant Monitoring		
• Modify Regulations regarding networks and siting (40 CFR 51.17)	EPA, Office of Air Quality Planning and Standards (OAQPS)	Promulgation of Regulations by mid-1978.
• Develop plans for implementation of changes to ambient monitoring program during the FY 1978-82 period. Plans to address as a minimum: --Estimate of resources required to implement monitoring program guidance --Development of minimum quality assurance program (See expanded description on p. 129) --Review of networks --SLAMS/NAQTS designation --Completion of SLAMS/NAQTS designation --Annual program for major Special Purpose Monitoring (SPM) projects --Review of meteorological data --Development of capability to display population exposure trends --Development of operational data storage and submission systems --Development of capability to prepare annual summary reports of SLAMS data	State/local agencies to develop ambient monitoring plans with guidance and technical assistance from the Regional Offices.	Initial plans to be developed during the first quarter of FY 1978. In preparing the FY 1978 program guidance dealing with development of these plans, SAMWG has recommended that most plan components be implemented during the FY 1978-80 period if at all possible. The minimum quality assurance program, however, must be implemented by the end of FY 1978. The implementation schedules for all other plan components should reflect each agency's respective needs, resources and capabilities. In general, implementation of all components should be accomplished within 5 years, however agencies having severe resource constraints may require longer than 5 years to implement some components of the strategy.
Clearinghouse for Monitoring Information (Criteria and Non-Criteria Pollutants)		
• Initiate cost and technical feasibility study	EPA, Office of Air Quality Planning and Standards (OAQPS)	Study to be started by June 1977 with results due by November 1977.
• Prepare operating procedures, make organizational arrangements and request OMB approval of information collection form.	"	Procedural and organizational arrangements to be completed by February 1978; approval of form to be initiated in February 1978.
• Prepare specifications for information handling system and receive approval of information collection form from OMB.	"	System specifications and form approval activities to be completed by August 1978.
• Collect initial information for clearinghouse	"	To begin August 1978 and be completed by November 1978.
• Develop information handling system and check and prepare initial information	"	System development to begin August 1978; checking and preparation of information to begin November 1978; both to be completed by January 1979.

TABLE IX-1. SCHEDULE OF STRATEGY ACTION ITEMS (CONT'D)

Action Item	Responsible Organization(s)	Period of Implementation
• Clearinghouse operational with initial information base.	OAQPS	Operational by January 1979.
Source/Emission Inventories		
• Establish work group to recommend improved inventory procedures and define possible revisions to data items in inventories of sources emitting criteria pollutants.	OAQPS, and representatives from State and local agencies and Regional Offices	Work group should be established by August 1977 and develop recommendations by December 1977.
• Develop complete inventories including point sources having potential emissions of 100 or more tons/year and area sources at the county level.	State/local agenices with technical assistance from the Regional Offices	This activity should begin early in FY 1978 and be completed by the end of the fiscal year.
• Prepare annual update of emission inventories in all areas where NAAQS are either violated or threatened.	State/local agencies with technical assistance from the Regional Offices.	This activity should be done annually starting in FY 1979.
• Annually submit to EPA updated information on all point sources having actual emissions of 100 or more tons/yr and on area sources in counties where NAAQS are either threatened or violated. Where the control agency knows of no change to the inventory, updating can be done by submission of changes to the year of record.	State/local agencies with technical assistance from the Regional Offices	Annual submissions will be required as soon as revised reporting regulations (40 CFR 51.7) have been promulgated. Promulgation should be done by early 1978.
Enhance Control Agency Quality Assurance Programs (Ambient and Source)		
• Develop a written State quality assurance policy which will be reviewed and approved by EPA for consistency with National quality assurance policy.	State/local agencies to have primary role. EPA to review, approve and provide technical assistance.	Preparation of written policies to begin by October 1977 and be completed by January 1978. Annual review of policy, thereafter.
• Review of existing measurement methods and other major quality assurance procedures and participate in performance surveys. Correct procedures as required.	State/local agencies to have primary role. EPA to review, approve and provide technical assistance.	Initial review of methods and procedures to be completed by April 1978. All necessary corrections implemented by July 1978.
• Develop and implement data validation procedures, training schedules and maintenance activities.	State/local agencies to have primary role. EPA to review, approve and provide technical assistance.	A defined data validation procedure should be operational by October 1978. Maintenance schedules and training plans should be developed and implemented by October 1978.
Non-Criteria Pollutant Monitoring		
• Develop and implement improved functional management scheme.	Research and Program Offices within EPA	A detailed analysis, with recommendations concerning alternate ways to accomplish this should be initiated during the latter part of FY 1977. The development of policies and assignment of organizational responsibilities should be accomplished early in FY 1978.

TABLE IX-1 SCHEDULE OF STRATEGY ACTION ITEMS (CONT'D)

Action Item	Responsible Organization(s)	Period of Implementation
• Establish program to analyze selected NAQTS samples for non-criteria pollutants.	Submission of NAQTS samples will be by State/local agencies. Lab analysis and reporting of results by EPA, ORD	Procedures for submission, analysis and reporting to be developed and distributed by November 1977. Analysis to start with samples collected on and after January 1, 1978.
• Establish anticipatory program of monitoring R&D.	Research and Program Offices within EPA	Implementation of a planned methods development program should begin in FY 1978. To the extent which resources are available, the pilot network of non-criteria monitors should become at least partially operational in FY 1979.
Data Systems--Planning and Operations		
• The Regional Offices should consult with State/local agencies to evaluate their respective needs for SLAMS data and SPM data and to determine the optimum location for storage of such data.	Regional Offices and State/local agencies with technical assistance by OAQPS	The needs evaluation should begin by the latter part of FY 1977. Optimum storage locations should be determined by December 1977.
• Subsequent to the above review, a written plan should be prepared for the development/acquisition and installation of storage and retrieval systems which meet these needs. (This will be one component of each State's plan for ambient monitoring.)	Regional Offices and State/local agencies.	Planning for new-revised storage and retrieval systems should be done during the first quarter of FY 1978. The specific implementation period for each agency will be jointly determined by the Regional Offices and the State/local agencies concerned.
• Technical support to suers of the Comprehensive Data Handling Systems (CDHS) should continue at a high level and expanded retrieval capabilities should be developed.	OAQPS	A high level of technical support should be continued for the next several years. Additional retrieval packages will be furnished to CDHS users in FY 1978. Additional CDHS improvements will be developed annually thereafter.
Develop Revised Regulations for Reporting Data (40 CFR 51.7)		
• Establish informal work group to recommend and define monitor site information items needed to document each NAQTS site.	OAQPS, and representatives from State and local agencies and Regional Offices	Work group should be established by April 1977 and develop recommendations by August 1977.
• Establish formal work group to develop revised reporting regulations for air quality and emission data.	OAQPS and selected representatives from other EPA organizations	Work group should be established by May 1977. Revised regulations should be promulgated by mid-1978.

TABLE IX-1 SCHEDULE OF STRATEGY ACTION ITEMS (CONT'D)

Action Item	Responsible Organization(s)	Period of Implementation
EPA Guidance/Documents		
• Source Inventories	OAQPS	The documents referred to consist of new publications as well as updates to existing publications Several are already in progress while the need for others has only recently been identified. Guidance documents should be made available to users prior to the period when the program addressed by the guidance is to enter a new phase Therefore, development of a number of guidance documents will be done in phases over the next several years. In most cases, firm schedules for particular guidance documents should be established annually in EPA's program plans. Special needs may dictate the development of guidance for which no need was identified during the annual planning process.
• Monitoring networks and siting	OAQPS	
• Point soruce monitoring	Office of Enforcement	
• Diffusion modeling	OAQPS	
• Statistical analysis techniques (peak values, trends, adjustment for meteorology)	OAQPS	
• Quality assurance	ORD	
• Analytical methods (technical assistance documents)	ORD	
• Data display techniques	OAQPS	
Air Quality Analyses		
• Develop technical guideline presenting techniques and procedures for use in developing isopleth concentration displays.	OAQPS	Guideline should be initiated by April 1977 and released to State and local agencies by October 1977.
• Review data bases to determine feasibility of developing population exposure trend displays for large metropolitan areas (e.g. exceeding 1,000,000 population).	State and local agencies. The Regional Offices will coordinate interstate analyses and provide technical assistance If requested, OAQPS will also provide technical assistance.	These reviews should be completed by the end of FY 1978.
• Preparation of population exposure trend displays for large metropolitan areas where the data is suitable.		Displays should be prepared by the end of FY 1980 if data bases are suitable.

APPENDIX A

COMPILATION OF QUESTIONS CONCERNING THE AIR MONITORING PROGRAM

ADEQUACY OF SIP MONITORING NETWORKS

- Are SIP ambient monitoring networks proper in terms of numbers and location of stations for the purpose of tracking SIP's (trends, attainment and maintenance)?

- Do SIP networks provide comprehensive data for the purpose of informing the public on progress towards achieving acceptable air quality?

- Are SIP networks adequate for supporting regulations and enforcement actions?

- Does the present number and location of monitoring sites provide an effective measure of respective ambient levels in urban areas? In nonurban areas? In vicinity of large point sources?

- Can the present combination of continuous and intermittent sampling equipment be shifted to different sampling schedules which will improve their utilization while preserving a statistically sound sampling scheme?

- What is the feasibility of meeting SIP data needs with a mixture of fixed stations and mobile monitors?

- Can urban SO_2 and TSP networks be reduced in size in areas where NAAQS are infrequently exceeded or where air quality patterns are well defined without sacrificing needed information?

- Can information lost by network cutbacks be more than adequately compensated by relocation of monitors to higher priority areas or pollutants? What are the potential resource savings of such a policy? How could such a policy be effectively implemented and over what time frame?
- Are monitors currently sited to represent population exposure?
- What steps need to be taken to ensure more representative siting of instruments in the future?
- Is our current state of knowledge adequate to define specific criteria for locating monitoring instruments to meet EPA, state, and local needs?
- What information should be developed or studies performed to provide better guidance on the numbers and location of monitors?

SOURCE AND EMISSIONS DATA

- What are the specific needs for source and emissions data required by EPA and State and local agencies?
- Is the present system for gathering source data and establishing emissions inventories adequate to meet the needs of EPA and State and local agencies?

- Are reports from states regarding source activity and source emissions complete, timely, and accurate enough to meet these needs?

POINT SOURCE MONITORING

- Should ambient monitoring around point sources currently regulated by SIP's be increased?
- Should this monitoring be used to support enforcement actions against sources not in compliance?
- What types and size of sources should be candidates for such monitoring?
- What legal and administrative actions can EPA take to require such monitoring?
- What additional pollutants besides those governed by NAAQS should be considered in any point source ambient program?
- Should EPA advocate that sources conduct ambient monitoring for reporting to EPA as a condition for operating permits and actions concerning variances, etc.?
- Can EPA initiate a system of conditions and checks on sources to ensure that adequate data are obtained in such instances?
- What resources would be required to initiate such a system and what types of sources would likely be affected?

MONITORING UNREGULATED POLLUTANTS

- For what pollutants should EPA be developing a monitoring program?

- Is the current program for obtaining data for such pollutants as sulfates, nitrates, organics, trace metals adequate in terms of the extent of monitoring coverage and analysis of subsequent data?

- What are the specific needs for monitoring data and information regarding these pollutants?

- What kinds of analyses should be applied to these data and how should these data and subsequent analyses be evaluated?

- Is there a need to store information about these pollutants, in a centralized clearing house?

USE OF AIR QUALITY MODELS

- Are air quality models being used as effectively as they might be used for planning purposes and for augmenting information from conventional monitors?

- Should calibrated models be used to establish specific source control actions either with or without supporting data from conventional monitors?

- What should be the agency's policy regarding the use of air quality models?

- What are the potential costs/benefits of such a policy and how might it be implemented? What are the specific data requirements?

- What degree of credibility do models have and to what degree must uncertainties be reduced to ensure ready acceptance in formulating policy and adopting specific control measures?

DATA AND INFORMATION QUALITY

- What are the essential elements of a comprehensive quality assurance program and how should they be implemented?

- What kind of system is needed to inform data users of the quality of the information derived from ongoing monitoring programs?

- What are the projected costs to the agency in terms of credibility loss, enforcement, and implementation setbacks if a more effective quality assurance program is not implemented?

- What should be the specific priorities for implementation of an overall quality assurance program in terms of payoffs to control and enforcement programs?

AIR QUALITY REPORTING

- Can EPA make valid national air quality assessments with data from a smaller number of monitoring stations than now reporting to EPA?

- Must EPA have raw data from all of the routinely reporting stations or would summary air quality statistics suffice?

- Should other information, such as the frequency of episodes, be collected from the states and if so, how often?

- Should EPA establish a "rapid" air quality reporting system to collect and report data from selected areas?

- What data are needed from other agencies for EPA to properly evaluate population-at-risk and population exposure to various pollutants?

- How can EPA better publicize monitoring information and the impacts of pollutant levels on public health and welfare?

DATA PROCESSING AND SUPPORT SYSTEMS

- Specifically, what is the hierarchy of data needs and data analysis capabilities required to carry out EPA's monitoring programs?

- Can the existing ADP systems and planned program of enhancements realistically meet existing and projected needs for monitoring and data analysis?

- If not, what kinds of alternative systems are needed for use in air quality planning, in evaluating the effectiveness of the SIP's, and in developing control regulations?

- Are efforts spent in data analysis adequate, especially in light of the costs required for monitoring?

- Should regions be developing their own systems to deal with the specific problems peculiar to the regions?

APPENDIX B

SUMMARY OF ISSUES AND RECOMMENDATIONS FROM ISSUE PAPERS

This appendix lists the issues raised and the recommendations made in eight of the nine issue papers prepared by the Standing Air Monitoring Work Group. No issues and recommendations were presented in the paper "Background and General Considerations in the Development of Strategy Issues for Improvement in Air Monitoring." The purpose of this paper was to set forth general considerations and background information valid for all pollutant monitoring systems and to explain the approach taken by SAMWG in evaluating existing or alternative monitoring systems.

At the time this version of the strategy document was printed, review of the paper "Strategy Issues for Non-Criteria Pollutant Monitoring" was still in progress. As a result, the recommendations given here are those which appeared in the original version of this paper. However, the recommendations reproduced here from the other seven papers reflect the many comments and discussions offered by those who were kind enough to review these papers in draft.

ISSUES AND RECOMMENDATIONS
FOR "STRATEGIES FOR IMPROVED SO_2 MONITORING"

ISSUE 1: Should There Be A Change In The Present Structure Of SO_2 Ambient Monitoring?

RECOMMENDATIONS:

(1) SAMWG recommends that EPA, in cooperation with State and local agencies, designate a limited number of fixed SO_2 National Air Quality Trend Stations (NAQTS) to be operated indefinitely for the purpose of analyzing and reporting national and local trends. These NAQTS would be complemented by additional State and local air monitoring stations (SLAMS) to provide needed information to evaluate SO_2 NAAQS attainment and progress brought about by air pollution control and abatement activities. The number of NAQTS in any specific area would range from 2-8 stations, depending on SO_2 concentrations levels and urbanized area population. NAQTS must meet the following criteria:

(a) have EPA approved continuous SO_2 analyzers.*

(b) be sited in accordance with EPA guidance and operated under EPA approved quality assurance procedures.

(2) SAMWG recommends that current SIP monitoring guidance (40 CFR 51.17) be modified to reflect the need for permanent trend stations (NAQTS and SLAMS) and to provide additional flexibility needed at the State and local agency level for monitoring activities to support SO_2 control strategy development and evaluation.

(3) SAMWG recommends that EPA increase its efforts to provide technical and operational guidance in the areas of SO_2 ambient

monitoring network design, recognizing the dynamic monitoring needs of the SO_2 monitoring program. The guidance should cover network size, siting criteria, sampling frequency, quality assurance, data base--as relates to both point source and urban monitoring.

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*It is recognized that at least for an interim period, many of these stations will be using non-continuous methods, especially at those stations where temperature effects are unimportant and for which annual averages are of highest concern. SLAMS should be scheduled for continuous analyzers as needs dictate and resources allow.

ISSUE 2: What Should Be EPA's Policy Regarding The Use And Interpretation Of SO_2 Bubbler Data?

RECOMMENDATIONS:

(1) EPA Regional Offices should continue to encourage State and local air pollution control agencies to evaluate their bubbler monitors regarding the effect of temperature on reported data. Where evaluation indicates that bubbler data have been inaccurate, Regional and State officials should review the status of SO_2 attainment of NAAQS which may have been influenced by inaccurate bubbler data.

(2) Bubbler sites which are susceptible to temperature effects should be:

(a) replaced with equivalent continuous monitoring instruments

(b) replaced with a modified bubbler operation which will not be subject to temperature effects

(c) be used to sample only during seasons in those areas where temperature effects are insignificant, or

(d) be terminated.

The appropriate decision by the Regional Office and State or local agency should be based on the need for information at the affected station and the cost of replacing or upgrading the bubbler.

(3) EPA should continue its intensive evaluation of the bubbler methodology, and as soon as possible either:

(a) modify the procedure so that it can be used under realistic field conditions, or

(b) take the necessary steps to establish a continuous reference principal and calibration procedure for ambient SO_2.

ISSUE 3: Use Of Diffusion Modeling Of SO_2 Concentrations

RECOMMENDATIONS:

(1) Where modeling is practicable, EPA should encourage the use of SO_2 diffusion models to:

- (a) augment ambient SO_2 networks in areas where SO_2 NAAQS are threatened
- (b) define emission limitations and regulations in special cases
- (c) estimate air quality increments caused by new sources, and
- (d) design and evaluate SO_2 air monitoring networks.

(2) EPA should standardize criteria for validation of SO_2 diffusion models for point sources and urban areas.

(3) EPA should provide increased technical assistance to States and local agencies wishing to employ standard EPA or other models for the purposes stated above.

ISSUE 4: Increasing Needs For Emission Source Monitoring Data

RECOMMENDATIONS:

(1) SAMWG recommends that State and local agencies complete baseline SO_2 emission inventories, with priorities determined by the severity of the SO_2 problem in each county.

(2) Baseline SO_2 inventories should be updated annually by the appropriate control agency and submitted to EPA for both point* and area sources.

(3) Detailed emission inventories necessary for dispersion modeling should be collected by State and local agencies only as needed. Agencies using diffusion models for development, evaluation, or revision of a SIP should retain the inventory for a period of time as specified by the EPA Regional Office.

(4) A minimum quality assurance program should be developed by ORD and implemented by the Regional Offices for source testing and continuous in-stack monitoring. Particular attention should be given to provide sufficient training where technical expertise is lacking.

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*SO_2 sources whose actual SO_2 emissions exceed 100 tons per year.

ISSUES AND RECOMMENDATIONS FOR "STRATEGY ISSUES FOR IMPROVED SUSPENDED PARTICULATE MONITORING"

ISSUE 1: Should there be a change in the present monitoring networks for suspended particulate matter?

RECOMMENDATIONS

1. National Air Quality Trend Stations

Through a cooperative effort between Federal, State, and local agencies, a minimum number of permanent national air quality trend sites (NAQTS) should be designated and operated indefinitely. The data from these stations would be used to analyze and report national, regional, and local trends. These stations need not be equivalent to the minimum number of stations currently calculated from 40 CFR 51.17, but a subgroup of the total.

Stations selected as a NAQTS must use the Federal Reference Method for suspended particulates and must implement EPA's quality assurance program for suspended particulates. They should represent sites which have at least three continuous years of valid data. The stations must also be located according to the most recent EPA network design and siting guidance documents. In addition, the selected stations should meet any one or combination of the following criteria:

a. represent to the extent possible the maximum concentration point of an urbanized area greater than 50,000 population. The site should not be significantly affected by an individual source. In areas not previously monitored, emission data and modeling should be used to establish site location.

b. represent an urbanized area which has a population greater than 50,000, is below the secondary standard, and has a high potential for significant air quality degradation.

c. represent to the extent possible areas of maximum population density.

2. State and Local Air Monitoring Stations (SLAMS)

a. The designation of State and local air monitoring stations (SLAMS) should be through a cooperative effort between the regional offices and State agencies.

The number of stations in this category would be decided by the States and regional offices. The SLAMS must use the FRM and adhere to EPA guidelines on network design and siting, as well as the quality assurance guidelines.

b. In view of the recently identified TSP station location deficiencies, a more comprehensive monitoring network for TSP problem identification should be established in widely dispersed industrial areas and industrial areas frequently located just beyond local jurisdictional boundaries. This may require increased cooperation between state and local agencies.

c. Nonurban background stations should be established to allow for the measurement of incoming transported TSP pollutants in special problem areas. This recommendation is also in response to current TSP station location deficiencies.

3. Special Purpose Monitoring Stations

SAMWG recognizes the numerous State and local demands for special purpose ambient air monitoring data. Because of the varied and unique requirements, the States should have prime responsibility for deciding the number of such stations, location, sampling frequency, length of study, and measurement method.

Whenever possible, the FRM should be used. In addition, EPA guidelines on quality assurance and network design and siting should be followed to the greatest extent.

4. The current SIP air quality surveillance requirements (40 CFR 51.17) should be modified to include:

   a. criteria for establishment and operation of national air quality trend stations, including quality assurance, number and location of stations, siting specifications, sampling schedule, and reporting requirements.

   b. designation of State and local air monitoring stations

   c. provisions which allow the State and local agencies more flexibility to respond to the variety of special purpose monitoring associated with the overall goal of attaining, and maintaining, ambient air quality standards.

ISSUE 2: Are improvements in the FRM for TSP needed?

RECOMMENDATIONS

1. EPA should critically review and evaluate the current FRM writeup and tighten up the shelter design specification, prescribe filter specifications, and attempt to clarify and improve the calibration and operation procedures.

2. All NAQTS and SLAMS should use filters conforming to the EPA specifications. To the extent possible, the special purpose monitoring stations should also operate with the standardized filters.

3. EPA should conduct further investigations of the feasibility of the use of the high-volume sampler in emergency episode situations.

4. EPA should continue its investigations of possible replacement methods for the FRM. The replacement method should have the

capabilities for continuous or short-term sampling, particle sizing and retention of sample for retrospect analysis.

ISSUE 3: Should the sampling frequency for TSP be varied or fixed?

RECOMMENDATIONS

On the basis of statistical considerations and the purposes of the data, SAMWG recommends the following schedules for TSP monitoring:

1. National Air Quality Trend Stations employ an every-sixth-day schedule as a minimum. Data obtained from any balanced schedule with more frequent monitoring is also acceptable. Additional data that result in an unbalanced schedule are not to be submitted to EPA but may be used by State and local agencies in combination with the balanced schedule data sent to EPA to evaluate compliance or progress at that site.
2. State and Local Air Monitoring Stations employ an every-sixth-day schedule as a minimum. This basic schedule may be augmented as required by the State or local agency to ensure sufficiently precise statements regarding the status or progress of the station.
3. Special Purpose Monitoring Stations may employ any monitoring schedule that is consistent with the intended use of the data.

ISSUE 4: What are the emission data and modeling needs for improving TSP control planning technology?

1. EPA should develop better techniques for estimating fugitive emissions from traditional sources.
2. Improved inventories of fugitive emissions in heavily industrialized particulate problem areas should be conducted.

3. State and local agencies should reassess their point source cut-off points in TSP problem areas to be certain that smaller sources which may now constitute a major percentage of the traditional source emissions, are receiving appropriate attention.

4. EPA should develop improved techniques for inventorying emissions from nontraditional sources in urban areas and support their use by State and local agencies.

5. EPA should develop and provide to the States a diffusion model which considers particle size, small-scale diffusion, and the deposition characteristics of emissions from nontraditional urban activity sources.

6. EPA should continue efforts to develop and document the mechanism of formation and models for the prediction of the secondary particulate pollutants sulfates and nitrates.

7. EPA should continue to conduct and support research efforts directed to improve our knowledge and understanding of short- and long-range transported particulates.

8. EPA should continue its efforts to develop continuous monitoring instruments to monitor particulate emissions from industrial sources. The agency should also support studies to provide the appropriate data necessary to convert opacity measurements made by existing continuous monitors into particulate emission rates.

9. EPA should establish quality assurance procedures for calibration and operation of source continuous monitors.

ISSUES AND RECOMMENDATIONS FOR "STRATEGIES FOR IMPROVED CO MONITORING"

ISSUE 1: Should there be a change in the Present Structure in CO Ambient Monitoring?

RECOMMENDATIONS

1. SAMWG recommends that a limited number of National Air Quality Trend Stations (NAQTS) be established in each urban problem area. A problem area is defined as:
   a. any urbanized area greater than 500,000 population
   b. any area where a TCP is in effect or under development for CO
   c. any area where measured air quality from monitors sited according to current guidance is not expected to reach the NAAQS by 1980 based on the projected emission improvements of the Federal Motor Vehicle Control Program.
2. SAMWG recognizes the possible need for additional State and local CO air monitoring stations (SLAMS) in addition to the NAQTS in the areas which meet the criteria of recommendation one.
3. SAMWG recommends that special purpose monitoring be performed to validate the suitability of permanent NAQTS or SLAMS locations for determining maximum and neighborhood air quality levels, to demonstrate or derive relationships of the permanent monitoring stations data to population exposure, to provide additional data in support of SIP control strategies, and to determine spatial distributions of CO air quality. Further, it is recommended that special purpose monitoring be done periodically in urban areas which do not have permanent monitoring stations to assure

that standards are being attained. If significant CO problems are uncovered, then a permanent station could be installed. Reference methods should be used where possible; however, grab or bag sampling and analyzers using electrochemical principals would be acceptable procedures for special studies.

4. The NAQTS should be operated in each of two locations, i.e., in areas of maximum pollutant concentration and in high density population neighborhoods. The sites should be standardized in terms of instrumentation, (reference methods or equivalent should be used), probe siting and quality assurance practices. Once established, the sites should not be moved so that a trend data base can be established.

5. SAMWG recommends that current SIP Monitoring Requirements (40 CFR 51.17) for CO be amended to allow the State and local agency to determine the need for and quantity of CO monitoring based on the criteria in recommendation one.

6. Standardized monitor siting criteria should be established for locating CO monitors. These criteria should include the general types of areas to be monitored, as well as the specific probe location at a site. These criteria should be followed by all involved with CO monitoring in support of SIP's so that a standardized, comparable data base is obtained.

ISSUE 2: Increasing Need for CO Air Quality Models

RECOMMENDATIONS

1. CO diffusion models should be used to estimate the impacts of increased CO levels from new and indirect sources.

2. EPA should standardize the validation procedure for CO diffusion modeling and provide guidelines and technical assistance to State and local agencies wishing to employ validated EPA or other models for use in predicting hot spot locations.

3. Greater emphasis should be placed on using validated models to estimate maximum CO levels at representative types of congested traffic areas for developing and evaluating control strategies.

ISSUE 3: Needs for Emissions and Source Monitoring Data

RECOMMENDATIONS

1. Baseline CO emission inventories should be completed for each county where National Air Quality Trend Stations are located or where SIP revisions are to be made. Local planning and transportation agencies should be consulted since they can usually provide most of the source data needed to make the emission estimates. Supplement 5 to AP-42, "Compilation of Air Pollutant Emission Factors" should be the source of all emission factors used in the baseline inventory.

2. Baseline CO inventories should be reviewed and updated annually by the appropriate control agency.

3. Detailed inventories necessary for control strategy analysis should be collected only as needed, but once begun should be updated annually for strategy evaluation. AP-42 can be used as the basis for emission calculations. However, SAMWG encourages control agencies to conduct a more extensive analysis of source characteristics in a specific area (especially near monitoring sites) since the factors in AP-42 are based on a national average.

4. Control agencies should collect traffic flow information and percent of vehicles by driving mode around CO monitoring sites if such information is available from planning or transportation agencies. The sites whose air quality data form the basis for SIP revisions should be done first. It would not be necessary to collect the information on a continuous basis, but rather over a short time period sufficient to establish the traffic flow patterns and vehicle mix.

ISSUES AND RECOMMENDATIONS FOR "STRATEGY FOR IMPROVED NO_2 MONITORING"

ISSUE #1: Should Any Changes Be Made In The Ambient Monitoring Structure for NO_2?

RECOMMENDATIONS

1. EPA, in cooperation with State and local agencies, should designate fixed NO_2 National Air Quality Trend Stations (NAQTS) to be operated for an indefinite period for determining progress toward achieving or maintaining NAAQS. Reference or equivalent, continuous methods should be used at these sites, to the extent practicable. These stations should be located in urbanized areas expected to experience concentrations near, or in excess of, ambient standards. It is expected that no more than two to four NAQTS would be needed in most major metropolitan areas. Only a few larger metropolitan areas with widespread, high NO_2 levels would need to designate a larger number of NAQTS sites.

2. Current SIP monitoring guidance (40 CFR 51.17) should be modified to reflect the prescribed criteria for fixed NO_2 NAQTS, and to provide additional flexibility, possibly including criteria for supplementary fixed or movable stations as needed by the State and local agencies for NO_2 and also oxidant control strategy development and evaluation. These criteria should consider current agency capabilities and resources.

3. EPA should provide additional technical guidance to State and local agencies regarding minimum, adequate network size, siting

criteria, sampling frequency, quality assurance, data base, etc. needed to assess ambient NO_2 levels relative to achievement/maintenance of the NO_2 NAAQS and state standards.

ISSUE #2: Relating Nitrogen Oxides (NO_x) Emissions and Ambient NO_2 Levels.

RECOMMENDATIONS

1. SAMWG recognizes that rollback models are the most practical models now available for developing and evaluating NO_x control strategies to achieve NO_2 ambient air standards. However, rollback models may over-simplify the relation of NO_x emissions to NO_2 air quality, while more sophisticated simulation models are presently too intricate, resource consuming, or have limited applicability. Therefore, EPA should vigorously pursue the development and evaluation of alternative simulation models and/or empirical-statistical modeling techniques to project ambient NO_2 concentrations. Such improved models would also have application in designing NO_2 monitoring networks and complementing existing monitoring data.

2. The rollback or modified rollback model should continue to be used as the principal tool for developing NO_x emissions control strategies until better models are developed and evaluated. However, use of current diffusion/photochemical models is encouraged in special cases or localities where resources for their application is available and their superiority over rollback techniques in developing workable strategies is indicated.

ISSUE #3: What Are The Needs For Nitrogen Oxides (NO_x) Emission Data, and What Changes Should Be Made In The Acquisition of These Data?

RECOMMENDATIONS

1. State and local agencies should complete baseline (listed in Table 4) NO_x emission inventories by county in areas threatening or violating ambient NO_2 standards. If baseline NO_x emissions data are needed in other state areas, EPA can develop the inventory data by national apportioning, unless the State or local air pollution control agencies decide to collect these data themselves. However, in any areas where State/local agencies do not complete baseline emission inventories, SAMWG recommends that they still collect the baseline data for these point sources emitting more than 100 tons/year of NO_x.

2. Baseline NO_x emission inventories compiled by State and local agencies should be updated, on a calendar year basis, by the appropriate control agencies and the updated data submitted to EPA. For control strategy development and trends purposes, a record should be retained by EPA or State/local agencies of emission inventories applicable to individual years. (An annual record of emissions data would allow an evaluation of the relationship between NO_x emissions trends and NO_2 air quality trends, and thus an assessment of the effectiveness of control programs.) (See also Chapter VII recommendations on data reporting and handling.)

3. Detailed emission inventory data for simulation modeling purposes beyond annual baseline needs should be collected by State

and local agencies only as needed. These data should be retained for a reasonable period for possible recurring modeling needs. The period of retention should be coordinated with the appropriate EPA Regional Office.

ISSUES AND RECOMMENDATIONS FOR "STRATEGIES FOR IMPROVED OXIDANT AND HYDROCARBON MONITORING"

ISSUE 1: Should measurement techniques for hydrocarbons and oxidants be changed?

RECOMMENDATIONS

SAMWG recommends that EPA begin a study to determine whether the FID NMHC analyzer is a satisfactory surrogate measurement for ambient organic carbon. If it is not, then EPA should immediately begin the development of a non-methane organic carbon (NMOC) analyzer.

ISSUE 2: What kind of oxidant monitoring networks are needed?

RECOMMENDATIONS

1. SAMWG recommends that a national air quality trend station network (NAQTS) for oxidants be established according to the location criteria for NAQTS. NAQTS must use a Federal Reference Method or equivalent and must operate in conformance with EPA's quality assurance program.
2. States and local agencies, in collaboration with the EPA regional offices, should examine their local oxidant networks and redesign them, if necessary, to better assess the regional oxidant problem. Statewide, and even interstate, planning should be undertaken in order to make most efficient use of present equipment.
3. State and local agencies should mount a monitoring program in appropriate areas, the purpose of which would be to learn of the local relationship between emissions and ambient levels of NMOC, NO_x, and oxidants and to determine which type of model (upper envelope curve, statistical, or photochemical diffusion) is the most appropriate for their special local use.

ISSUE 3: What should be done about improving organic compound emission inventories?

RECOMMENDATIONS

1. SAMWG recommends that EPA, in collaboration with state and local agencies, should agree upon a procedure for compiling base-line inventories of oxidant precursors. All agencies should follow the same procedure so that inventories from all areas can be compared on a common basis.

2. State and local agencies having oxidant problems should initiate compilation of their NMOC inventories as soon as a satisfactory procedure is available. The agencies should make every effort to keep the inventories current.

ISSUES AND RECOMMENDATIONS OF TAPE SAMPLER MONITORING ISSUES PAPER

ISSUES:

There are four issues:

1. The Number of Samplers Needed: If an area is not prone to episodes, should tape sampler monitoring be continued? If an area is prone to episodes, should the level of monitoring be continued or would a reduced number be adequate?

2. The Frequency At Which These Samplers Should Be Operated: Should samplers be operated all year, even if episodes are known to occur only during a short time during the year?

3. Reporting of Data to EPA: Should data be reported to EPA that have only marginal or no use? What type of data are needed at each organizational level?

4. Alternative Monitoring Techniques: Should other monitoring techniques be used in place of tape samplers to collect the necessary information for activating emergency episode procedures?

RECOMMENDATIONS:

1. Eliminate all tape sampler monitoring in areas that do not experience or are not prone to episodes.

2. Retain at least one tape sampler in areas experiencing episodes or prone to emergency episodes. Staggered 24 hour high volume sampling could be used instead of tape samplers. It may be necessary to monitor at more than one site in an area especially if more than one control agency is involved or if several areas of high emissions from individual sources exist.

3. Operate the additional samplers only when episodes occurred. This could be achieved by using air stagnation advisories (ASA) as a triggering mechanism to operate the instruments, by running one tape sampler all year, or if TSP high volume measurements 675 $\mu g/m^3$ (24-hr only). (Operation of all samplers year round would also be acceptable.)
4. Areas experiencing high TSP concentrations due to natural fugitive dust would not need to monitor.
5. Only summary type information would be sent to EPA.

ISSUES AND RECOMMENDATIONS FOR "STRATEGIES FOR POINT SOURCE MONITORING"

ISSUE #1: Should EPA Require Significant Emissions Point Sources to Have Permanent Point Source Monitoring (PSM)* Programs?

RECOMMENDATIONS

1. Point sources should not be required to establish permanent full-scale PSM programs to continually assess environmental impact due to high resource requirements. However, air pollution control agencies at all levels should examine the advantages of more limited PSM requirements such as submission of fuel analysis data by power generation sources and process feed data by other categories of sources as a compliance monitoring tool.

2. All air pollution control agencies should increasingly require PSM as necessary to support specific program needs, and to be used as a more effective enforcement and program implementation tool. A form of PSM with stipulated scope should be required for sources subject to new source review where prevention of significant deterioration is an issue.

3. EPA program offices should assist RO's and State and local agencies, in the form of technical support documents in conduct of programs where PSM may be required. Generally, discretion and flexibility to apply PSM requirements should rest with RO's or State and local agencies except for requirements specifically regulated, such as continuous source emission monitoring.

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*Point Source Monitoring includes: ambient monitoring around a source, manual source tests, continuous in-stack monitoring, fuel analyses, and dispersion modeling.

ISSUE #2: What Should be the Scope of PSM Activities When They Are Conducted?

RECOMMENDATIONS

1. EPA Headquarters program offices should assist RO's and State/local agencies by defining the PSM data needs required for specific program area. The spectrum of PSM activities needed to furnish these data should also be defined.

2. EPA should strengthen program efforts, to ensure that valid, reliable PSM techniques are available, and can be conducted cost effectively.

ISSUE #3: Who Should Conduct PSM Programs?

RECOMMENDATIONS

1. The burden of conducting and paying for point source monitoring should be placed on the responsible source. Factors such as cost of monitoring, sensitive litigation, and special studies may mitigate this rule. This decision should be made by the appropriate control agency official on a case-by-case basis.

2. The control agency should provide an overview of PSM programs developed by sources. Appropriate review and concurrence of proposed PSM programs, with final acceptance being based on how effectively the proposed PSM will satisfy pertinent program requirements, should be an integral part of this overview activity. Appropriate resources must, therefore, be programmed to ensure the adequacy of PSM data.

3. Quality assurance procedures for conduct of PSM activities should be established. Acceptance of source-generated PSM data should be premised on use of standardized QA procedures. EPA should provide

appropriate technical assistance to State and local agencies relating QA procedures.

ISSUE #4: How Should Point Source Monitoring Data be Controlled and Reported?

RECOMMENDATIONS

1. Raw data from PSM activities should not be submitted to EPA on a routine basis since quarterly excess emission reports, along with program mandated source inspections provide an adequate enforcement system.

2. A national clearinghouse should be established to collect and store pertinent information related to each PSM activity conducted in order to centralize and facilitate dissemination of information concerning PSM activities.

3. Continuous in-stack monitoring requirements should continue to be set for all major sources when feasible. Consideration should also be given to requirements for monitoring and reporting of process feed data such as fuel sulfur content or other relevant parameters which can provide an indication of a source's compliance status. SAMWG considers this high priority inasmuch as the data is essential to ensure continuing source compliance and is a very useful component of PSM systems conducted for various program purposes. Similarly, high priority should also be given by EPA to the development and improvement of continuous monitoring instruments for all major categories of sources and all regulated pollutants. It is specifically recommended that continuous monitoring instruments or other techniques be developed to monitor particulate emissions from industrial sources or alternately, to convert opacity measurements made by existing continuous monitors into particulate emission

rates. EPA should also continue efforts to develop remote source and long path monitoring techniques to be used as adjuncts to PSM systems.

4. That EPA continue to establish QA procedures and techniques for validating the accuracy of data produced by source continuous monitors. This will ensure that the adequacy of such data submitted to control agencies as part of emission monitoring regulations or as part of other PSM requirements imposed by control agencies.

5. Manual source testing should continue to be a case-by-case decision to be made by the responsible control official whether it is to be required solely or as part of a more comprehensive PSM system. Data from these tests should, however, be retained and available through cross-referencing from the PSM National clearinghouse discussed herein. Data from these tests should be available on a national basis to all cognizant control agencies, and to industry sources, subject to confidentially restriction.

ISSUES AND RECOMMENDATIONS FOR "STRATEGIES FOR NON-CRITERIA POLLUTANT MONITORING"

ISSUE #1: Is there a need for functional direction of non-criteria pollutant monitoring? If so, what should be considered in the operational aspects of the program?

RECOMMENDATIONS

1. As is the case with criteria pollutants, EPA should charge a group with responsibility to provide direction to operational non-criteria pollutant monitoring. It is essential that this activity be closely coordinated with and use the results of EPA's ongoing research activities, quality assurance, methods standardization, and criteria pollutants equivalency programs.
2. EPA should assemble, in an Agency-wide effort, a priority list of pollutants for monitoring methods development. Health and welfare effects should be of primary concern.

ISSUE #2: What actions should be taken to quickly respond to the needs for non-criteria pollutant monitoring when standard methods are not available?

RECOMMENDATION

1. The responsibility and resources for evaluating and recommending state-of-the-art monitoring methods for non-criteria pollutants should be assigned to a specific program within EPA which would conduct both laboratory evaluation and field testing. It is essential that these activities be closely coordinated with EPA's existing field monitoring and quality assurance activities.

ISSUE #3: What effort should be taken to meet the growing needs for baseline non-criteria pollutant data?

RECOMMENDATION

1. EPA should continue and expand its program of monitoring for priority non-criteria pollutants in various urban atmospheres and other appropriate locations.

ISSUE #4: How can the exchange of non-criteria pollutant monitoring information be accomplished?

RECOMMENDATION

1. EPA should establish a central information point for collecting and disseminating information about non-criteria pollutant monitoring projects. This would include projects by State and local agencies, private firms, and other Federal organizations.

APPENDIX C-1

INTRODUCTION

The purpose of this Appendix is to provide additional information on the design of the NAQTS and SLAMS networks and to provide guidance for the siting of monitoring instruments. The Appendix is divided into four parts:

1. Design of NAQTS Including Statistical Considerations
2. Siting for NAQTS
3. Additional Considerations in Siting SLAMS
4. Probe Siting Criteria for NAQTS and SLAMS

It should be recognized in designing the SLAMS and NAQTS networks, that a site designated as a NAQTS for one pollutant could be designated as a SLAMS for other pollutants; e.g., an SO_2 NAQTS site could have SLAMS monitoring collocated for TSP, NO_2 or O_3.

Special purpose monitoring is not covered in this Appendix because in most cases the location of the monitors and siting of instrument probes is dependent on the purpose of the study. The probe siting criteria in Part 4 to this Appendix should be followed to the extent possible if the usefulness of the air quality data will be compromised.

PART 1: DESIGN OF NAQTS INCLUDING STATISTICAL CONSIDERATIONS

SO_2 and TSP NAQTS Criteria

Generally, it is desirable to have a larger number of NAQTS in the more polluted and densely populated urban and multi-source areas. Table C-1 and C-2 indicate the approximate number of permanent monitors believed to be needed in urban areas to characterize national and regional TSP and SO_2 air quality trends and geographical patterns. The criteria require that the number of stations vary from a high of approximately 6 to 8 in areas where urban populations exceed 500,000 and concentrations exceed primary NAAQS, down to as few as one or two (or none) in smaller urban areas where the SO_2 or TSP problem is minor. The actual number of stations and their location will be decided by negotiation between EPA and the State agency.

Generally, the "worst" air quality in an urban area should be used as the basis for control strategies. This may, however, exclude air quality levels caused predominately by single point source emissions (e.g. remote power plants or smelters).

To estimate the number of urban areas which would meet the criteria shown in Table C-1 and C-2, pollutant concentration data from SAROAD were used.

To guarantee a reasonable geographical balance, SAMWG recommends that at least one TSP and SO_2 NAQTS be established in each state. Without this requirement, it is conceivable that many states would have no TSP or SO_2 NAQTS and this would create an undesirable data gap. Where not otherwise indicated, this NAQTS would be located in the largest urban area or the heaviest industrial area.

The estimated number of TSP monitors which would be required in the NAQTS network ranges from approximately 500 to 1000. The actual number of monitors in any specific area would depend on local factors such as meteorology, topography, urban and regional air quality gradients, and the potential for significant air quality improvement or degradation. Generally, the greatest density of stations would occur in the northeastern states, where urban populations are large and where pollutant levels are high. Fewer monitors are necessary in western states, especially for SO_2, since concentrations are seldom above the NAAQS in urban areas. Exceptions to this will occur, however, in areas where an expected shortage of clean fuels indicates that ambient air quality may be degraded by increased SO_2 emissions. In such cases, a minimum number of national trend stations is desirable to provide EPA with a proper national perspective on any changes.

CO NAQTS Criteria

EPA Headquarters needs information on ambient CO levels in major urbanized areas where CO levels have been shown, or inferred to be of significant concern. At the national level, EPA will not routinely require data from as many monitors as are required for TSP, and, perhaps SO_2 , since CO trend stations are designed to monitor the overall progress of the emission controls required by the Federal Motor Vehicle Control Program (FMVCP).

Although State and local air programs may well require extensive monitoring to document and measure the local impacts of CO emissions and emission controls, an adequate national perspective is possible with as few as two monitors per major urban area. As described in the main text, the two types of situations which would require CO NAQTS are: (1) peak concentations areas such as are found around major traffic arteries and near heavily travelled streets in downtown areas (such areas are measured in what is referred to as middle scale--i.e., tens to hundreds of meters); and (2) neighborhoods where concentration exposures are significant. Peak concentration sites will generally be strongly influenced by local sources such as heavy automotive traffic, while neighborhood sites more generally reflect the combined impact of all vehicular sources in the urban area. Neighborhood sites are generally more suitable for ascertaining trends and exposures to CO over widespread portions of urban areas, while peak CO concentration sites more adequately characterize "worst" conditions within local areas. (In addition to data from these two types of area, EPA requires information from a minimum of one station in a small subset of the urban areas requiring transportation control plans. Such information is needed to document the ambient effects of major shifts in commuting patters brought about by the TCP's and/or other factors.)

Because CO is generally associated with heavy traffic and population clusters, urban population is the principal criterion for identifying candidate urban areas for which pairs of NAQTS for this pollutant will be required to meet the needs described above. In addition, areas where CO ambient levels are known to be a problem will also be required to maintain NAQTS. The following specific criteria will be applied in locating and selecting candidate areas for placing pairs of permanent CO trend stations

(a) Any urbanized area greater than 500,000** population

(b) Any area where a TCP is in effect or under development for CO, and;

(c) Any area where air quality measured by monitors sited according to current guidance is not expected to reach the NAAQS by 1980 on the basis of projected emission reductions from the Federal Motor Vehicle Control Program.

Table C-3 presents a national summary of areas following under criteria listed above, according to information available from the U.S. Census, and air quality data stored in the NADB.

This strategy will require approximately 77 urban areas to operate paired CO monitoring stations on a permanent basis. A total of 11 urban areas will need to install additional CO instruments, either because no CO monitoring is now taking place,

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** On the basis of routine data and various special purpose monitoring efforts, it is thought that these areas have, or will have CO concentrations well above the NAAQS.

or because only one monitor is in operation.

Nationally, approximately 450 CO monitors are now known to be in operation. The total number of permanent trend CO stations under this strategy is approximately 154, which is less than 35 percent of the total number of stations now operating. Most (66) of these urban areas currently have at least a pair of CO monitors. The major impact of this strategy will be in the effort required of the State and local agencies in evaluating and possibly relocating existing CO stations to be consistent with EPA location criteria.

NO_2 NAQTS Criteria

From a national perspective, the current NO_2 ambient air quality problem is not as extensive or as severe as with other pollutants. Accordingly, the need for an extensive NAQTS network is not as great. It is estimated that there are approximately 30 areas in the country which have, or may have, a potential problem in meeting the NO_2 NAAQS over the next 5 years. These areas will definately have one or more NAQTS.

In addition, urban areas where population exceeds 1,000,000 should have permanent trend stations because of the general association (See Table C-4) between population and high annual average NO_2 levels, and also to assure appropriate representation of populous areas. In 1974 data from SAROAD, over half of the 25 urban areas above 1,000,000 showed annual NO_2 averages in excess of 75 $\mu g/m^3$.

Listed below are the criteria for choosing candidate urban areas for NO_2 NAQTS:

(a) Any urbanized area which does not meet or only marginally* meets the annual NAAQS for NO_2 100 $\mu g/m^3$, annual arithmetic mean (measured or estimated);

(b) Any urbanized area that clearly meets the NO_2 annual NAAQS but is projected to not meet the annual NAAQS by 1980. Such urbanized areas would be those which have annual NO_2 levels at or above 75 $\mu g/m^3$, but less than 100 $\mu g/m^3$-annual arithmetic mean (measured or estimated). This assumes a projected growth rate of NO_x emissions of about 5 percent per year. Other local emission growth rates or NO_x emission reductions may be substituted to project 1980 levels;

(c) Any urbanized area not currently being monitored where the urban population exceeds 1,000,000**;

(d) At a later date, if a short-term standard should be set, additional areas may need to be added, depending on the value of the short-term NAAQS and projections for meeting the standard by 1980.

Using the criteria recommended above, and air quality data from SAROAD, the approximate number of urbanized areas expected to have NAQTS are shown in Table C-5. Within urban areas requiring NAQTS, a range of from 2 to 4 permanent monitors is sufficient. The actual number in any specific urban area depends on local factors such as area size, the magnitude of the NO_2 problem, the number of significant NO_2 "hot spots" projected rates of growth, meteorological factors favorable to NO_2 formation, and topography. Nationally, this strategy will result in a range of approximately 75 to 150 NO_2 monitors. These numbers are to be compared with a national total of approximately 1000 stations where NO_2 monitoring is now conducted.

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*within 10% of Standard

**over 50% of those areas now monitoring show annual average exceeding 75 $\mu g/m^3$. Future growth and growing concern over peak NO_2 concentration effects will necessitate national assessments for these areas.

Ozone NAQTS Criteria

A current survey of oxidant monitoring shows that about 500 monitors are now operating and reporting data to EPA. Of these, three-fourths have had one or more hours in excess of the NAAQS.

SAMWG believes that accurate national assessments of ozone concentrations and trends can be outlined with somewhat fewer stations. After reviewing the existing monitoring station distribution and ambient concentration levels throughout the country, SAMWG believes that adequate ozone data can be obtained with around 170 to 200 ozone monitors. Criteria for selecting (or establishing, if necessary) NAQTS are as follows:

(1) Any urbanized area having a population of more than 250,000 and which exceeded the oxidant NAAQS at any time in the past 3 years; and

(2) Any area (AQCR or urban place) where oxidant concentrations are definitely a problem related to urbanization.

The first criterion, thus, is essentially population oriented and will include those relatively highly populated areas where most of the oxidant precursors originate, while the second criterion will pick up those additional areas where there is definitely an oxidant problem related to urban emissions (most probably due to transported oxidant or precursors). Table C-4 gives the number of areas which fit these two criteria.

Each urban area will generally require only two national ozone trend monitoring stations. These stations should generally be located downwind of the urban core according to predominant summer/fall daytime wind patterns. The exact location would depend on local factors affecting the transport and accumulation of peak O_3 levels; however, the locations should be balanced by the need to represent population exposure to ozone.

TABLE C-1

TSP NATIONAL AIR QUALITY TREND STATION CRITERIA

ESTIMATED NUMBER OF URBAN AREAS (Approximate Number of Stations Per Area)[4]

Population Category	High Conc.(1)	Med. Conc.(2)	Low Conc.(3)	Totals
High Population > 500,000	29 (6-8)	15 (4-6)	2 (0-2)	46
Medium Population 100,000-500,000	35 (4-6)	51 (2-4)	39 (0-2)	126
Low Population 50,000-100,000	14 (2-4)	27 (1-2)	31 (0)	76
TOTALS	78	93	72	248

(1) High. Conc. - Exceeding Primary NAAQS by 20% or More

(2) Med. Conc. - Exceeding Secondary NAAQS

(3) Low Conc. - Less than Secondary NAAQS

TOTAL STATIONS NATIONWIDE: 531 to 928 (Note: It is desirable that every state be represented by at least one TSP monitor)

(4) Selection of urban areas and actual number of stations per area will be decided by negotiation between EPA and State agency.

TABLE C-2

SO_2 NATIONAL AIR QUALITY TREND STATION CRITERIA

ESTIMATED NUMBER OF URBAN AREAS (Approximate Number of Stations Per Area)[4]

Population Category	High Conc.(1)	Med. Conc.(2)	Low Conc.(3)	Unknown Status	Total
High Population > 500,000	5 (6-8)	16 (4-6)	24 (0-2)	1	46
Medium Population 100,000-500,000	4 (4-6)	12 (2-4)	94 (0-2)	16	126
Low Population 50,000-100,000	0 (2-4)	5 (1-2)	52 (0)	19	76
TOTALS	9	33	170	36	248

(1) High Conc. - Exceeding Primary NAAQS

(2) Med. Conc. - Exceeds 60% of Primary or Secondary NAAQS

(3) Low Conc. - Less than 60% of Primary or Secondary NAAQS

TOTAL STATIONS NATIONWIDE: 139 to 454 (Note: It is desirable that each State be represented by at least one SO_2 monitor)

[4] Selection of urban areas and actual number of stations per area will be decided by negotiation between EPA and State agency.

TABLE C-3
NATIONAL SUMMARY OF CO NAQTS

Criteria for Selection	Estimated* Number of Urbanized Areas Meeting Criteria
Population greater than 500,000	46
TCP in Effect or Under Development	31
Not Expected to Meet Standards by 1980	25

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*Actual urbanized areas having CO NAQTS negotiated between EPA and air pollution control agency.

TABLE C-4

NO_2 ANNUAL MEANS (1974) BY URBAN POPULATION

μg/m^3

Urbanized Areas	≥ 100	75-100	75	No Suitable Data	Total
> 1,000,000	5	8	12	–	25
500,000 - 1,000,000	1	5	12	3	21
< 500,000	0	2	108	92	202
TOTAL	6	15	132	95	248

TABLE C-5

NATIONAL SUMMARY OF NO_2 NAQTS

Criteria for Selection	Estimated* # of Urbanized Areas Meeting Criteria
Areas not meeting or only marginally meeting NAAQS	16
Areas that meet NAAQS now but may not by 1980	14
Areas greater than 1,000,000 population not included above	8

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*Actual urbanized areas having NO_2 NAQTS negotiated between EPA and air pollution control agencies.

TABLE C-6

NATIONAL SUMMARY OF O_3 NAQTS

Criteria for Selection	Estimated* # of Urbanized Areas Meeting Criteria
Urbanized area >250,000 population which exceeded oxidant NAAQS anytime over last 3 years	80
Any area where oxidant concentrations are an urban related problem (not meeting above criterion)	5

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*Actual urbanized areas having O_3 NAQTS negotiated between EPA and air pollution control agencies.

STATISTICAL CONSIDERATIONS IN THE DESIGN OF THE NAQTS NETWORK

The purpose of this section is to provide background material concerning the number of sites in the NAQTS network as related to the probability of detecting trends. As a general rule, the more sites in the network the better the chance of detecting a trend. Also, the greater the trend rate the easier it is to detect a trend. While these general notions are correct, they are also simplistic, and it is useful to attempt to quantify some of these relationships. Although this requires certain assumptions that are somewhat arbitrary, the basic results still provide a relative indication of the impact of network size on trend assessment.

Perhaps the most logical place to begin a discussion of network size and trend assessment is to consider available historical data. The most recent EPA trends report presents nationwide TSP trends for the past five years based upon data from approximately 2000 sites. Instead of using all 2000 sites, it is possible to choose every fourth site in each region and use this subset of 500 sites to depict trends. When this was done, there was virtually no difference in the trend graphs. In fact, as shown in Figure C-3, a cumulative frequency distribution of the means of the subset of 500 sites for 1975 is almost indistinguishable from that for all 2000 sites. This suggests that for practical purposes, the same trends could have been determined from a much smaller network. The obvious question, though, is "how much smaller?"

Theoretically, this question can be examined statistically to provide an answer. If the variability of the data is known, it is possible to compute the probability of detecting certain rates of change over a specific number of years for various network sizes. Table C-7 shows these results for two-, three-, and five-year periods. However, it should be recalled that this table is based on an assumption as to the variability of the data, which in this case, is the annual mean air quality at a site. For this discussion, it was assumed that the variability is ±20%, i.e., a 95 percent confidence interval around the annual mean would be ±20%. For those familiar with this type of table, it may be mentioned that it was computed using power curves for two-sided t-tests at the 95 percent level for two means or for the slope of regression equation.

The assumption of ±20% variability, although somewhat arbitrary, may be regarded as a "ballpark" figure. The sampling error from an every-sixth-day schedule would be roughly ±10%, and so an overall variability of ±20% may be regarded as a reasonable approximation for this discussion.

From this table, a maximum network size of 1000 sites on the national level seems reasonable. A minimum size of 500 also appears acceptable. In the case of TSP, however, it is unlikely that the same rate of change would apply throughout the nation. Regional differences in the TSP problem make it essential that the network also be useful for regional trend assessment. In most practical applications, trends will be assessed on the basis of 3 to 5 years of data to minimize the impact of meteorological influences. With 50 to 100 sites in each geographical region, there is a reasonably good change of detecting three-year trends of more than 2 percent per year.

Using the allocation indicated for a TSP trend network of 500-1000 sites, there would be a reasonable chance of determining 5-year trends of more than 3 percent per year in the medium population cities with high TSP but less than 50/50 chance of detecting 3-year trends of less than 5 percent per year in any city. So the overall range of 500-1000 NAQTS TSP monitors seems to be acceptable for the purposes of national and regional trends, and does not appear to be too dense a network.

It should be noted that this table does not imply that the cause of the change or trend is known. For example, a 2-year change of 5 percent may, in fact, be due solely to meteorology with no change in emissions. There are various ways to minimize this potential problem. One way is to attempt to adjust the data for meteorology prior to any trend determination. Another way is to use several years of data and hope that the meteorological influence is averaged out. In actual practice, a little bit of both approaches is usually employed, but until meteorological adjustments become more routine, extreme caution should be used for any air quality trend determined from two years of data.

The previous discussion has concentrated on trend assessment for TSP. In principle the same basic tables might apply for trends in other pollutants but there are certain practical differneces that permit smaller networks for these other pollutants. These points will be discussed briefly. To a certain degree, the arguments are somewhat heuristic, but are sufficient to indicate the thinking involved in recommending smaller NAQTS networks in these cases.

For sulfur dioxide, there are two points worth noting. First, there are more urban areas with low SO_2 levels than with low TSP levels (170 versus 72). Secondly, background is higher for TSP than SO_2. As a consequence, air quality is more sensitive to SO_2 emission changes than is the case with TSP. For example, a 2 percent reduction in TSP emissions from traditional sources might yield a 1 percent reduction in ambient TSP levels while a 2 percent reduction in SO_x emissions might yield a 2 percent improvement in air quality. With these considerations in mind, a NAQTS network for SO_2 of 150-500 sites may sufice.

NO_2, CO, and O_3 may be considered automotive-related pollutants. For these pollutants the FMVCP results in controls primarily on the national level, although there are areas with additional control programs. However, this causes the primary focus on trends to be national in scope and there is not as much emphasis on differentiating regional trends. This makes it possible to use fewer sites and to concentrate primarily on areas with known or potential problems.

TABLE C-7

PROBABILITY OF DETECTING CHANGE OVER 2 YEARS

Number of Sites	Annual Rate of Change						
	.01	.02	.03	.04	.05	.10	.20
3	.03	.04	.06	.07	.09	.23	.59
5	.04	.05	.07	.09	.12	.35	.89
10	.04	.07	.10	.14	.20	.61	.99
25	.05	.11	.18	.29	.42	.94	1.00
50	.07	.17	.32	.52	.71	1.00	1.00
100	.11	.29	.56	.81	.94	1.00	1.00
200	.17	.52	.85	.98	1.00	1.00	1.00
500	.35	.89	1.00	1.00	1.00	1.00	1.00
1000	.61	.99	1.00	1.00	1.00	1.00	1.00

PROBABILITY OF DETECTING CHANGE OVER 3 YEARS

Number of Sites	Annual Rate of Change						
	.01	.02	.03	.04	.05	.10	.20
3	.04	.07	.11	.10	.23	.69	1.00
5	.05	.09	.15	.24	.35	.89	1.00
10	.07	.14	.27	.43	.61	.99	1.00
25	.11	.29	.56	.81	.94	1.00	1.00
50	.17	.52	.85	.98	1.00	1.00	1.00
100	.29	.81	.99	1.00	1.00	1.00	1.00
200	.52	.98	1.00	1.00	1.00	1.00	1.00
500	.89	1.00	1.00	1.00	1.00	1.00	1.00
1000	.99	1.00	1.00	1.00	1.00	1.00	1.00
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TABLE C-7 (continued)

PROBABILITY OF DETECTING CHANGE OVER 5 YEARS

Number of Sites	Annual Rate of Change .01	.02	.03	.04	.05	.10	.20
3	.08	.19	.38	.59	.78	1.00	1.00
5	.11	.29	.56	.81	.94	1.00	1.00
10	.17	.52	.85	.98	1.00	1.00	1.00
25	.35	.89	1.00	1.00	1.00	1.00	1.00
50	.61	.99	1.00	1.00	1.00	1.00	1.00
100	.89	1.00	1.00	1.00	1.00	1.00	1.00
200	.99	1.00	1.00	1.00	1.00	1.00	1.00
500	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1000	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00

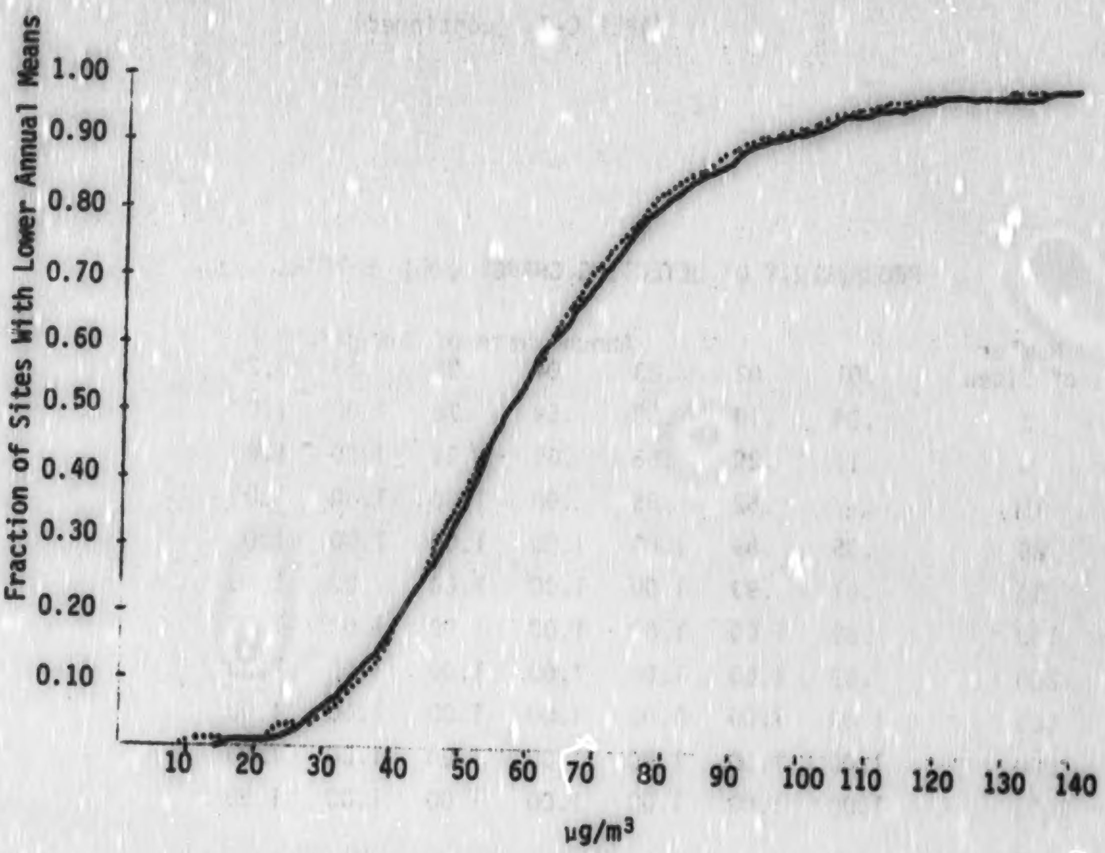

Figure C-1 Cumulative frequency distribution for 1975 mean TSP (500 and 2000 site networks)

PART II: SITING FOR NATIONAL AIR QUALITY TREND STATIONS (NAQTS)

The preceeding section of the Appendix has outlined the basic criteria for selecting geographic areas where NAQTS monitoring is to be conducted.

As explained in the main body of the report, the National Air Quality Trend Sites (NAQTS) should be located in areas of peak pollution concentration and in areas which combines high population density and pollution levels. In cases where these two situations, i.e., peak concentration and high population density, coincide, then only one monitoring site will be necessary. Further, it is desired that these sites not be unduly influenced by any single point source since the primary objective of these sites is to assess national trends.

The following material contains the procedures to be followed in locating NAQTS within these geographical areas. (Insofar as possible, the SLAMS should also be located according to these procedures. Part III of this Appendix presents additional factors to be considered in siting SLAMS.) The discussion is presented according to pollutant since it is desired that each pollutant network be designed and sited independently. Only when optimum sites for each of the pollutants have been determined, should one consider the combination of pollutant sites at one location. Clearly, where there are several possible locations for a National Air Quality Trend Station (NAQTS), and one of these locations has a NAQTS for another pollutant, then that site should be chosen.

In general, NAQTS are intended to measure air quality on the neighborhood* scale, with the exception of CO, for which both neighborhood and middle** scale measurements are appropriate. Further, it is desirable that NAQTS be located in the areas where the maximum pollutant concentration for specific time averages are expected as shown in Table C-8.

A final consideration in selecting NAQTS is that more than one monitor may be necessary to adequately establish peak concentrations. The location of peak level concentrations varies because of the following factors: (1) source emission patterns cause different locations of long and short term maxima; (2) meteorological fluctuations; and (3) changes in emission patterns caused by growth and emission control.

Procedures for Locating NAQTS

Sulfur Dioxide and TSP

There are various patterns of SO_2 or TSP sources which may exist in a given area: single point sources, clusters of point sources, area sources, a mix of area sources and a point source, or a mix of area sources and a cluster of point sources. When siting NAQTS (or SLAMS, if appropriate) each of these source configurations should be evaluated separately. For example, for area sources only, the maximum 24-hour and annual averages are likely to be in the same general area, and thus only one monitoring site would be necessary for determining peak concentrations.

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*NEIGHBORHOOD - Represents conditions throughout some reasonable homogeneous urban sub-region with dimensions around 1-2km. Homogeneity refers to concentration but may apply to land use as well.

**MIDDLE - Similar to neighborhood but represents conditions in the range of hundreds of meters. In the case of CO, the area may be more irregularly shaped because the homogenity follows patterns of freeway corridors or streets.

To determine which areas are subject to highest SO_2 and TSP concentrations, it is desirable to first obtain emission, meteorological and population density information. Other factors such as height of release of major pollutant contributors and topographical information on the study area should also be collected.

Dispersion modelling is extremely useful for predicting areas of maximum 24-hour and annual pollutant averages. The degree of sophistication required in the model depends on the complexity of sources, meteorology and topography. If modelling or special monitoring studies are not possible for determining areas of peak concentration, then technical judgements based on maps of emission densities, wind roses, topography and past air quality data must be made.

Once model outputs and population density maps have been assembled, candidate areas for the two types of NAQTS can be readily identified.

Carbon Monoxide

The motor vehicle is the predominant source of CO emissions. Thus, peak concentrations will occur among or near clusters of motor vehicle source activity. In order to adequately reflect the concentrations of CO in an urban area, two types of

NAQTS are necessary; a maximum or peak concentration site and a neighborhood site.

The peak concentration site is usually found near heavily travelled downtown streets, but could be found along major arterials, either near intersections or at low elevations which are influenced by downslope drainage patterns under low inversion conditions. The peak concentration site should be selected so that is it representative of several similar source configurations in the urban area, where general population has access. Further, it is not necessarily in the area of absolute maximum concentration. It is recognized, however, that this site does not represent the wide-scale urban problem. Thus, a second type of site, the neighborhood site, is necessary to provide data representative of the high concentration levels which exist over larger geographical areas.

The neighborhood site should be located in areas with a stable, high population density, projected continuity of neighborhood character, and high traffic density. The site should be located where no major zoning changes, new highways, or new shopping centers are being considered. The site should be where a significant CO pollution problem exists, but not be under the influence of any one source. Rather, it should be representative of the overall effect of the sources in the urban area.

Nitrogen Dioxide

Nitrogen Oxides (NO_2 + NO) are emitted almost entirely from fuel combustion sources. A limited number of industrial processes emit NO_x. Only a small fraction of the total NO_x emission consist of NO_2. Most of the NO_2 found in the atmosphere results from oxidation of NO to NO_2. When ozone is present, the conversion of NO to NO_2 will proceed rapidly; therefore, areas of peak NO_2 concentrations are expected downwind of clusters of NO_x point sources or many small area sources.

In most urban areas, proven and practicable models for predicting NO_2 concentration isopleths are not available. Thus, areas of peak concentration must be determined from past air quality or emission density information coupled with meteorological data. Peak levels of NO_2 are generally found in winter. Thus monitoring sites should be selected downwind of maximum emission density areas based on wintertime patterns. Also, peak NO_2 concentrations would be expected in areas which combine the conditions of expected high ozone concentration with high NO_x emissions.

Two types of NAQTS sites are envisioned: one in the area of peak concentration, and one which combines high population density and high pollution levels.

Oxidants

Oxidants are not directly emitted into the atmosphere but result from a complex photochemical reaction involving organic compounds, oxides of nitrogen and sunlight. Thus, the buildup of oxidants tends to be rather slow and to occur over relatively large areas. Under transport wind conditions, peak concentrations may be 15 to 30 kilometers downwind of areas with emission densities of NO_x and organic compounds. The peak concentration of oxidant may occur closer or further from the center city or areas of peak emission densities depending on city size and wind speeds.

Each urban area meeting criteria discussed in Part II would generally require only two ozone trend monitoring stations. One station would be representative of maximum ozone levels under wind transport conditions. It should be located approximately 15 to 30 kilometers or further downwind of the CBD based on predominant summer/fall daytime wind patterns. The exact location should balance local factors affecting transport and buildup of peak O_3 levels with the need to represent population exposure. The second station should be representative of high density population areas on the fringes of the CBD along the predominate summer/fall, daytime wind direction. This latter station should sense peak O_3 levels under light and variable or stagnant wind conditions. Two NAQTS ozone stations should be sufficient in most urban areas since spatial gradients for ozone generally are not as sharp as for other criteria pollutants.

As in the case of the NO_2, models generally are not available for determining concentration patterns of oxidants. Thus, past air quality data and wind trajectory patterns coupled with NO_x/organic compound emission data and population density maps must be used in determining suitable locations for NAQTS.

TABLE C-8

AVERAGING TIMES OF INTEREST FOR NAQTS

Pollutant	Averaging Time
SO_2	24-hour, annual
TSP	24-hour, annual
NO_2	annual
O_3	1-hour
CO	1-hour, 8-hour

PART III: ADDITIONAL CONSIDERATIONS IN SITING STATE/LOCAL AIR MONITORING STATIONS (SLAMS)

As explained in the main body of this document, State/local air monitoring stations (SLAMS) are to be the subject of negotiations between EPA Regional Offices and the various control agencies. In locating appropriate SLAMS sites, Part II of this Appendix should be used wherever possible. In addition, the following should also be considered:

1. Sulfur Dioxide - The primary use of SO_2 data will be to demonstrate compliance with NAAQS and provide part of the basis for studying secondary pollutant formation. Consideration should be given to sites in populated areas where modeling or previous monitoring indicate potential violations of NAAQS. In areas currently below SO_2 standards, but subject to fuel switching or rapid growth, data may be necessary to evaluate current control strategy revisions. Where SO_2 levels have significant fluctuations throughout the year, consideration should be given to monitoring SO_2 only during the season when elevated levels will occur.

2. Total Suspended Particulates - As with SO_2, first priority should be for TSP data in populated areas to demonstrate compliance with NAAQS. In addition to roof-top monitors, special attention should be given to locating some TSP monitors at low levels (3 meters) in urban centers to insure compliance with NAAQS in the breathing zone. For areas of rapid growth or changing

emission patterns, there may be a need for TSP trend data. Also, since rural TSP levels may be significant or transport may be a problem there may be a need for long-term background TSP data.

It is obvious that TSP could be monitored at many locations within an area. In order to reduce the amount of fixed monitoring, typical sites should be selected on the basis of the "worst" case analysis, with special purpose monitoring used to back up these sites.

Monitoring for emergency episodes should be considered part of the SLAMS network. Only those areas which are episode prone (as discussed more fully in the Tape Sampler Issue Paper) should be considered for episode monitoring. Either tape sampler or hi-vol monitoring would be acceptable for this purpose. Generally, a major reduction in the use of tape sampler monitoring is recommended due to the relatively few areas that are episode prone.

3. Carbon Monoxide - CO violations occur primarily in localized areas near major roadways and intersections with high traffic density and poor atmospheric ventilation. As these violations can be predicted by ambient air quality modeling, a large fixed network of CO monitors is not required. Long-term CO monitoring should be confined to a limited number of "peak" and "neighborhood" sites in large metropolitan areas to measure maximum pollution levels and determine the effectiveness of control strategies. There is little need for background CO data.

4. Ozone - Since large areas experience ozone violations, only a few selected sites should be included in the SIP. These sites should be located both to measure peak levels downwind of the central city of large metropolitan areas, with emphasis on areas of high population density, and to measure transport of ozone into these metropolitan areas. The NAQTS sites will generally suffice for development of long-term ozone data needs in areas where they are located.

A detailed number of urban ozone sites will be necessary to measure population exposure or trends and to provide a data base for new source review. Where ozone levels have significant fluctuations throughout the year, consideration should be given to monitoring ozone only during the seasons when elevated levels will occur.

5. Nitrogen Dioxide - Compliance stations should be located in major metropolitan areas with a limited number of trend stations located in smaller metropolitan areas. The need for background NO_2 sites has a low priority. Additional sites may be necessary as a result of special studies related to the hydrocarbon NO_2 ratio and oxidant formation.

6. Hydrocarbons - All hydrocarbon monitoring should be treated as special purpose monitoring until the current methodology and instrument problems are solved.

PART IV: PROBE SITING CRITERIA FOR NAQTS AND SLAMS

Once the general area for locating the station has been identified and a suitable monitoring site has been established which is secure and accessible, attention must be given to the siting of the monitoring probe.

Table C-9 presents the recommended probe siting criteria for each of the pollutants of interest. The criteria were selected to standardize siting practice. In addition, it was desired to be as close as possible to the breathing zone without obstructing pedestrian traffic or subjecting the intake of the probe to vandalism. Further, vertical and horizontal distances above supporting structures were specified to minimize the effects of the air stream passing near surfaces where chemical reactions may take place and to avoid situations where unusual micro-meteorological conditions may exist.

Distances from influencing sources were also specified to standardize the effects these sources have on the measurement process. This is essential if a comparable data base is to be developed. Also distances from vegetation were specified since they can serve as pollutant sinks.

These probe siting criteria should be viewed as goals rather than rigid requirements which must be met in all cases. SAMWG recognizes that physical constraints may make meeting these criteria impractical. In these cases, the rationale or reasons for not meeting the probe siting criteria should be documented.

TABLE C-9. PROBE SITING CRITERIA FOR NATIONAL AIR QUALITY TREND SITES (meters)

Pollutant	Height Above Ground	Distance from Supporting Structure		Comments
		Vertical	Horizontal[a]	
SO_2	3-15	>1	>1	*20 meters from trees *if on roof, no furnace or incineration flues should be nearby *no obstructions in directions of frequent wind
TSP	2-15	N.A.	>2	*20 meters from trees *if on roof, no furnace or incineration flues should be nearby[b] *no obstructions in directions of frequent wind
O_3	3-15	>1	>1	*20 meters from trees *>20 meters from motor vehicle traffic or parking lots
NO_2	3-15	>1	>1	*20 meters from trees *>20 meters from motor vehicle traffic or parking lots
CO	3±1/2	>1	>1	*at least 10 meters from intersections

N.A. = not applicable

[a] when the probe is located on a rooftop, this separation distance is in reference to walls, parapets or penthouses located on the roof.

[b] distance is dependent on height of furnace or incinerator flue, type of waste or fuel burned and quality of fuel (sulfur & ash content). The goal is to avoid undue influences from minor pollutant sources.

APPENDIX D

DATA REPORTING AND HANDLING

I. Monitoring and Program Objectives

Twelve data uses have been identified, as shown in Table D-1. These are the monitoring program objectives which have been discussed at length in the individual issue papers of SAMWG. These twelve uses can be summarized in two major data use objectives: ambient monitoring program objectives and source monitoring program objectives. These are shown, together with the primary methods of achieving the major objectives, in Table D-2. Specific categories of data may be matched directly with the methods (and, therefore, the major objectives). These categories of data--items of information which must be collected, stored/ retrieved, analyzed, and some cases published/distributed for further use--are shown in Table D-3.

The contribution of data reporting and handling, following the collection of the data and preceding analysis of the data, is a rather minor contribution, less than three percent, to the total cost of the comprehensive air monitoring system.

II. Ambient Criteria Pollutant Information

Ambient monitoring information includes not only the air quality concentrations and resulting statistics, but also considers site information, which adequately describes the site and equipment used for sampling, quality assurance information about the collection and analysis of the sample and surface meteorological observations.

Little air pollution meteorological data are being collected and stored by EPA at this time; however, it is anticipated that the

TABLE D-1. MONITORING PROGRAM OBJECTIVES

(Data Uses)

1. Evaluate progress and judge attainment/non-attainment of NAAQS (incl. modeling).
2. Develop/revise/evaluate State implementation and control plans (incl. modeling).
3. New source review, maintenance of NAAQS and prevention of significant/non-significant deterioration (incl. modeling).
4. Develop/revise National monitoring programs, control strategies and policies (incl. forecasting, trends and resource management).
5. Model development and research.
6. ESECA activities and EIS preparation and review (incl. modeling).
7. Support of enforcement activities (incl. source compliance, legal actions and modeling).
8. Public information and FOI requests (incl. population exposure and trends).
9. Establishment of NAAQS and other health research (incl. new pollutants and population exposure).
10. Episode documentation and control activities.
11. Establishment of stationary and mobile source emission standards (incl. control technology R&D).
12. Other special studies.

TABLE D-2. METHODS OF ACHIEVING MAJOR OBJECTIVES

AMBIENT MONITORING

1. National Air Quality Trend Stations (NAQTS)
2. State/Local Air Monitoring Systems (SLAMS)
3. Special Purpose Monitoring
   (Including Moveable Monitors)
4. Air Quality Modeling

SOURCE MONITORING

1. Emission Inventories
2. Stack Testing
3. In-Stack Monitoring
4. Ambient Point Source Monitoring

TABLE D-3. CATEGORIES OF DATA

AMBIENT MONITORING

1. Ambient criteria pollutant observations
   Site Information
   Quality Assurance Information
   Surface Meteorological Observations

2. Ambient Non-criteria Pollutant Observations
   Site Information
   Quality Assurance Information

SOURCE MONITORING

1. Point and Area Sources of Criteria Pollutants
2. Point and Area Sources of Non-criteria Pollutants
3. Point Source Monitoring Observations (Ambient and Stack,
   Criteria, and Non-criteria)
4. Enforcement/Compliance Information

quantity of this information required for submittal in the future will increase. The more comprehensive upper atmosphere meteorological data required for modeling will probably not be available and, therefore, provision for the handling of these data will not be considered at this time.

It has been determined that additional information about the site of the monitoring station and the instruments and procedures used is required beyond that currently being collected and stored. These additional items must be identified and provision made for their storage, retrieval and analysis. Quality assurance information also should be made available to data users, and again the information elements must be identified and a method for handling such data must be developed. At this time few data are available, although a computerized system for handling selected items does exist. This system would need to be expanded and enhanced to accommodate the influx of more comprehensive site and quality assurance information.

SAMWG is recommending a national network of monitoring sites with primary purpose of reporting National Air Quality Trend Station (NAQTS) data. These stations would meet the HQ EPA requirements and would be fewer in number than the currently operated State/local network of nearly 9,000 sites (see Chapter IV). There were 7749 monitors proposed under SIP's (see Table D-4). Excessive monitoring, above the levels proposed or required for SIP's, utilizes resources which could effectively be used for increasing data quality rather than quantity. Table D-4 shows that current monitoring for TSP is 281 percent of SIP requirements. This additional workload probably is a contributing factor to the lateness of data submittals for TSP and other pollutants, as shown in Table

TABLE D-4. NUMBER OF MONITORS (Required by SIP's, Proposed in SIP's, Reporting in 4th Quarter 1975*)

State	TSP			SO_2			NO_x			CO			O_x			Total Pro.	AQDHS-II Installed	State AQ System
	Req.	Pro.	Reported IV '75	Req.	Pro.	Reported IV '75	Req.	Pro.	Reported IV '75	Req.	Pro.	Reported IV '75	Req.	Pro.	Reported IV '75			
Alabama	37	38	74	17	19	34	0	0	16	3	3	3	4	4	3	64	x	
Alaska	11	28	19	7	7	4	0	2	1	1	1	3	0	0	0	38	x	
Arizona	16	35	55	18	17	18	11	13	11	3	4	10	3	3	4	72	x	
Arkansas	9	29	46	4	6	16	1	1	12	0	0	0	0	0	0	36		
California	65	102	80	17	40	43	30	66	74	28	57	61	32	81	83	346	x	
Colorado	27	66	73	8	14	7	0	6	3	3	6	5	3	6	5	98	x	
Connecticut	19	67	64	17	35	50	10	24	41	5	6	6	5	7	1	139	x	
Delaware	3	20	15	3	36	7	1	24	0	1	4	0	1	4	0	88		
District of Columbia	4	10	0	4	6	0	3	4	0	1	5	0	1	2	0	27		
Florida	30	30	10	21	22	7	20	20	5	0	0	0	4	3	0	75	x	
Georgia	43	56	59	36	40	36	15	17	32	0	3	2	1	1	0	117	x	
Hawaii	3	12	10	1	9	9	0	9	9	0	2	0	0	2	0	34		
Idaho	15	35	24	7	11	8	0	0	1	0	0	0	0	0	0	46		
Illinois	56	125	155	53	82	87	12	27	70	10	16	3	10	12	17	262	x	
Indiana	45	124	83	38	121	57	13	70	54	4	7	1	4	7	3	329	x	
Iowa	33	44	48	13	16	24	2	4	8	0	1	2	2	2	4	67	x	
Kansas	34	59	58	6	38	40	0	36	39	1	5	6	3	5	5	143		
Kentucky	30	165	119	17	173	124	10	163	119	0	14	7	3	12	7	527		x
Louisiana	5	9	30	15	19	17	0	0	0	0	0	0	5	6	3	34		
Maine	13	22	25	13	25	25	0	0	2	0	0	1	0	0	1	47		
Maryland	31	74	71	29	64	56	14	38	56	6	20	0	6	19	0	215		x
Massachusetts	34	63	51	30	88	66	16	69	53	6	11	8	6	12	4	243	x	
Michigan	29	127	120	27	63	48	21	41	26	0	10	8	0	5	0	246		x
Minnesota	27	68	71	22	32	37	10	13	17	4	4	5	0	5	1	122		x
Mississippi	11	29	29	9	19	19	0	1	3	0	0	0	2	3	2	52		x
Missouri	30	75	52	15	17	9	7	16	7	6	13	5	6	13	6	134	x	
Montana	13	14	34	14	15	13	0	0	3	0	0	1	0	0	2	29		
Nebraska	12	29	42	7	7	10	6	7	8	0	0	3	0	0	0	43		x
Nevada	13	34	11	8	8	0	5	8	1	2	2	0	2	3	1	55	x	
New Hampshire	8	32	30	9	17	15	0	13	11	0	2	2	0	1	2	65	x	
New Jersey	19	50	9	20	27	9	7	8	8	8	22	0	7	7	0	114		x
New Mexico	16	52	44	9	27	31	0	18	0	1	3	3	3	3	1	103	x	
New York	72	336	9	58	90	8	26	28	9	13	29	0	19	23	0	506		x
North Carolina	54	165	132	11	131	111	0	0	108	0	4	0	2	5	2	305		
North Dakota	6	15	28	2	2	8	0	1	7	0	0	0	0	0	0	18	x	
Ohio	78	255	277	55	140	152	45	129	124	0	24	8	16	24	14	572	x	
Oklahoma	24	98	1	7	18	2	0	0	3	0	4	0	4	4	0	124	x	
Oregon	20	27	47	7	8	9	0	4	2	3	4	5	3	3	4	46		
Pennsylvania	68	116	110	42	59	10	45	60	3	11	50	10	11	44	10	329		x
Puerto Rico	3	22	4	4	22	3	0	19	3	0	1	0	0	0	0	64	x	
Rhode Island	7	25	17	7	25	20	6	25	19	0	4	2	0	4	1	83	x	
South Carolina	40	68	72	20	45	56	0	0	48	0	0	1	1	1	2	114	x	
South Dakota	6	6	14	4	4	1	0	0	1	0	0	0	0	0	0	10		
Tennessee	39	96	101	18	51	54	11	38	48	0	5	3	5	7	7	197	x	
Texas	52	221	80	49	232	73	27	79	76	1	79	1	19	81	10	692		x
Utah	11	19	23	11	21	16	10	21	4	2	5	4	2	5	4	71		
Vermont	4	10	11	5	9	1	0	1	0	0	1	0	0	1	0	22		
Virginia	55	108	7	23	56	0	21	40	0	2	7	0	7	7	0	218	x	
Washington	31	72	60	14	25	20	10	13	3	7	9	6	5	7	5	126		x
West Virginia	24	37	42	12	23	28	0	0	0	0	1	0	0	3	0	64		
Wisconsin	24	74	83	9	39	34	10	14	15	0	9	1	4	11	4	147		x
Wyoming	7	10	40	3	3	7	0	0	5	0	0	0	0	0	0	13	x	
Guam	1	2	3	4	4	4	0	0	4	0	0	0	0	0	0	6		
Virgin Islands	3	6	4	4	4	0	0	0	0	0	0	0	0	0	0	10		
Samoa	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	2		
																7749	25	12

*As of October 1, 1976.

D-4, where, nine months after the end of the fourth quarter of 1975, many monitoring sites were still delinquent.

It is much more effective and efficient to submit individual observations, rather than summary statistics. For example, if 31 summary values (Table D-5) were submitted quarterly for each of 1000 sites, over 120,000 summary values would be handled annually compared to the 227,000 observations now submitted or the 80,000 actually required by SIP's. The number of summary items processed for continuous monitoring devices would be even more significant, considering the calculation of overlapping intervals, possibly exceeding the number of observations. The quality control involved with submittal of summary statistics would be very complex, cumbersome, and perhaps impossible to coordinate. The submittal of summary statistics only does not prove to be a cost or effort-saving alternative, especially if the unavailability of observations for verification of questionable summary values precipitates additional personnel resource expenditures.

State/local air monitoring systems (SLAMS) will continue to operate, collecting information primarily of use and interest to the State and local agencies. It may be useful, on an "as needed" basis, for EPA RO's or HQ to request a portion of these data. In such instances either "hard copy" or machine readable form may be requested; when machine readable data are requested, the SAROAD format must be used. Every effort should be made to avoid development of data handling systems, in RO's for SLAMS data, which would be duplicative of SAROAD and result in severe drains on manpower resources for both development and operation. Coordination of uniform statistical computational procedures, if duplicative systems

TABLE D-5. SUMMARY ITEMS

I. For all entries

1. 10th Percentile
2. 30th Percentile
3. 50th Percentile
4. 70th Percentile
5. 90th Percentile
6. 95th Percentile
7. 99th Percentile
8. First high value
9. First high count
10. Second high value
11. Second high count
12. Third high value
13. Third high count
14. Percent of Possible Observations
15. Arithmetic mean
16. Geometric mean
17. Arithmetic Standard Deviation
18. Geometric Standard Deviation
19. Median
20. Minimum
21. Half the minimum detectable
22. Number of Observations
23. Number of times substitute value used
24. Sum of observations
25. Sum of natural logs of observations
26. Units code
27. Flag for criteria
28. Number of primary violations
29. Number of secondary violations
30. Time of occurrence of second maximum
31. Time of occurrence of maximum

II. Also for running average intervals

32. Second maximum
33. Minimum
34. Number of observations
35. Number of primary violations
36. Number of non-overlapping primary violations
37. Number of secondary violations
38. Number of non-overlapping secondary violations
39. Units code
40. Time of occurrence of second maximum
41. Time of occurrence of maximum

42 - 54 (Repeat items 1-13)

were developed, would be very difficult and computer resources would be utilized ineffecitvely. SAROAD will continue to provide storage/retrieval service for voluntarily submitted SLAMS data.

Monitoring which is done as a part of a short-term or special study usually results in data which should not be used for general purposes such as trend analysis. These data are usually so specialized that no other use--outside of that special purpose for which collected--should be made without discussion with the originator or collector of the data. Such data need not be submitted to centralized data banks, but rather remain the responsibility of the data orignator.

III. Ambient Non-Criteria Pollutant Information

Ambient non-criteria pollutant information, observations, site and quality assurance information, etc., are usually collected in special projects and are used in setting ambient and emission standards or in developing national strategies or long-range criteria studies. Currently few data are received from outside of EPA, about 15 percent of the total data stored annually; however, State/local agencies and other monitoring groups which collect such data are encouraged to submit available information to EPA for access and use by all interested parties.

The time elapsed from the end of a data collecting period until data are available for use includes one month for sample submittal and six months for sample analysis.

The needs of the various research and development organizations, the prime collectors and users of non-criteria ambient air quality data, currently are being met by their own data collection/

storage/retrieval/analysis systems. It is recommended that all ambient non-criteria pollutant data be stored within EPA in a centralized system, with a single point of dissemination and publication in order to avoid unnecessary duplication of efforts and enhance the ease and speed of data availability.

IV. Point and Area Criteria Pollutant Emission Information

Currently there are 175,000 points/processes in 45,000 facilities (Table D-6 indicates statistics for early 1976) in the EPA point source emissions data bank. Many of these sources are very small and create an unnecessary overhead in maintaining the data banks. Even though the small sources may be of significant importance to the State/local agencies, it is not cost effective to submit data on these sources to a centralized data bank since EPA HQ has little need for such data. The need for emissions related data for all very large sources and for large sources in areas not meeting air quality standards or in areas in which the standards are being threatened has been discussed at length previously. These data are necessary both for energy/environmental/economic strategies analysis and for other activities utilizing air pollutant dispersion modeling.

Data on sources should be submitted to cover an annual period, although to reduce and/or equalize workload it would be beneficial to submit data on a regular basis throughout the year or to forward the information as available, rather than as a single annual submittal. Table D-7 indicates (for TSP) that many small sources are in the existing data files. Ideally, the minimum source size for use by EPA in strategy analysis is 100 T/yr of any single air pollutant (actual emissions).

TABLE D-6. NUMBER OF PLANTS

STATE	TOTAL NUMBER OF PLANTS*	EIS/P&R INSTALLED	STATE EI SYSTEM
ALABAMA	361		
ALASKA	178	x	
ARIZONA	373	x	
ARKANSAS	268		
CALIFORNIA	5,328	x	
COLORADO	271	x	
CONNECTICUT	153		x
DELAWARE	110	x	
DISTRICT OF COLUMBIA	47		
FLORIDA	902		
GEORGIA	872	x	
HAWAII	136		
IDAHO	297		
ILLINOIS	697		x
INDIANA	1169	x	
IOWA	655		x
KANSAS	1,682		
KENTUCKY	754	x	
LOUISIANA	416		
MAINE	576		
MARYLAND	213		
MASSACHUSETTS	1,100	x	
MICHIGAN	714		x
MINNESOTA	635	x	
MISSISSIPPI	1,546	x	
MISSOURI	876	x	
MONTANA	109	x	
NEBRASKA	1,382		x
NEVADA	120		
NEW HAMPSHIRE	277		
NEW JERSEY	560		
NEW MEXICO	317		
NEW YORK	5,513		x
NORTH CAROLINA	2,055	x	
NORTH DAKOTA	657	x	
OHIO	1,323		x
OKLAHOMA	227		
OREGON	723		x
PENNSYLVANIA	1,589		
PUERTO RICO	247	x	
RHODE ISLAND	266		
SOUTH CAROLINA	456	x	
SOUTH DAKOTA	897		
TENNESSEE	743	x	
TEXAS	496	x	
UTAH	84		
VERMONT	154		
VIRGINIA	663	x	
WASHINGTON	769		x
WEST VIRGINIA	199		
WISCONSIN	302		x
WYOMING	78		
GUAM	15		
VIRGIN ISLANDS	17		
	40567	20	10

*In NEDS data bank, February 1976.

TABLE D-7. PROFILE OF 80,000 PARTICULATE POINT SOURCES IN 35,000 PLANTS*

Source size (T/yr)	Percent of the total number of point sources with particulate emissions		Percent of total national particulate emissions
	Points	Plants	
0-100	89	84	8
101-500	8	11	13
>500	4	5	79

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*Size distributions for other pollutants indicate more larger sources than for particulate. There are an additional 8,000 plants with 52,000 points having no particulate emissions.

TABLE D-8. COMPLETENESS OF SOURCE INVENTORY DATA BASE

Data items	Percent of completeness* by source size		
	0-100 T/yr	101-500 T/yr	>500 T/yr
Identifiers			
General Information	90	90	90
Emission Related Data	95	95	97
Data for Modeling	88	90	80
Enforcement Data	70	50	50

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*As of October 1976.

Based upon an anticipated reduction in required reporting, the previous discussion has indicated that information on 20,000 particulate sources in 6,000 plants will be submitted each year. The number of other facilities emitting 100+ T/yr of the remaining criteria pollutants (not included in the TSP estimates) are:

SO_x - 4000

NO_x - 1500

HC - 9000

CO - 1000

$$15{,}500 \times 3.5 \ \frac{\text{Ave. no. pts.}}{\text{Facility}} = 52{,}500 \text{ emitting points}$$

These, combined with the TSP sources, total 72,500 emitting points to be included in the data file. This workload exceeds that which might be accomplished manually, thereby necessitating an automated system. In addition, it may be expected that efforts at increasing the completeness of information about plants/sources would result in an increase in automatic data processing activities.

More detailed and accurate data on area (county) sources are required for national strategy analysis, especially in areas exceeding or threatening NAAQS. Currently all area source data are collected and compiled internally at EPA headquarters. These data are, for the most part, apportioned from larger areas (such as States) which have statistics available. This procedure is insufficiently sensitive in the estimating of emissions of certain pollutants (such as HC and CO) from some source categories (such as LDV, HDV, and other transportation sources). Although VMT or fuel consumption figures are sometimes available to EPA, for the most part these data are only available from local governmental agencies. For use in dispersion modeling--again in areas where NAAQS are exceeded or threatened--it is very important that data available locally be submitted for the estimation of area source emissions.

At this time emissions calculating capabilities are limited primarily to total HC, whereas a more significant and more usable statistic would be emissions of the organic classes of compounds. Actions should be taken both in emission factors and data handling to provide for the calculation of these emissions.

More detailed data about large sources are required for in-depth modeling studies. These sources dominate the dispersion model results; therefore, the parameters most frequently used in the modeling calculations must be available and resources should be assured to maintain annual currency and freedom from errors which would render the modeling results incorrect. Table D-8 indicates the percent completeness for point source data, with about 10 percent of the important items of data missing. For 22,500 point sources approximately 500,000 items of necessary data are currently unavailable.

There is some question as to the need for all of the data now required for each point source in the file. A study group, formed from data users, should ascertain exactly which items of information are absolutely required, and the data system modified accordingly.

V. Point and Area Non-Criteria Pollutant Emissions Information

The collection of point and area non-criteria pollutant source information is primarily a special studies activity, and as far as EPA usage is concerned, this activity seems to be oriented towards the setting of both NAAQS and emissions standards.

These data are now collected internally and the needs of the various HQ organizations, the prime collectors and users of non-criteria source inventory data, currently are being met by their own data collection/storage/retrieval analysis systems. State/local agencies and EPA do collect such information, on as as-needed basis, and may be contacted infrequently by potential data users. When such data are available, it is suggested that submittal to EPA HQ would result in greater useability and availability when incorporated into the existing system.

VI. Point Source Monitoring Observations (Criteria and Non-Criteria Pollutants)

Both in-stack and ambient monitoring are associated with point source monitoring. Both of these activities are usually associated with special studies or enforcement actions. The in-stack data results do not provide information for development of emission factors since the many other variables required for the development of emission factors (throughput amount and composition, theoretical and actual operating rates, control device operating parameters, etc.) are not known. The ambient monitoring is usually at fence line or anticipated plume touch down or other areas of high concentration and, therefore, does not represent general population exposure locations. Neither of these data results are suitable for generalized data usage. Although probably meeting the specialized needs very well, they should not be stored in centralized EPA data banks, but rather be held by or storage arrangements made for by the data originator.

Source test/emissions monitoring data collected by EPA which are sufficient for development of emission factors should be submitted within EPA in accordance with EPA Orders. State/local agencies willing to share such information should contact EPA, and arrangements will be made to collect the data.

VII. Enforcement/Compliance Information

Currently, although there is a capability for storage/retrieval of compliance information in the existing air data systems, such data are usually stored in the Compliance Data System (CDS) which is a management information tracking system operated by DSSE, OEGC. This situation seems to adequately meet the requirements of RO's. However, a major problem exists for some blocks of data in that the source ID's for the air data systems and CDS are not compatible. It is, therefore, impossible in many cases to put the engineering/emissions data together with the compliance information.

This problem must be rectified to increase the useability and usefulness of both systems. Some efforts are currently underway to correct the ID mismatch, but some RO's have not yet begun to make the changes required such that any source in both CDS and NEDS must have the NEDSXREF number (ID) coded into the appropriate CDS format. There is no intention of having all sources common to both data banks, however. Those which appear in both banks should be cross-referenced and kept up to date. This will require RO coordination and resolution of discrepancies when/if State/local agencies or RO's change ID numbers.

VIII. Categories of Data Users

Seven categories of data users have been identified, as shown in Table D-9. Each of these user groups have somewhat different use requirements. In order to ascertain the specifications for the required data handling systems, it is necessary to ascertain the requirements of each of the user groups. In many instances the requirements may be conflicting, in which case resolution will be necessary, usually selecting the more stringent specifications.

The number of requests processed by RO's directly is not known at this time. However, in the future, anticipating additional computer capability, only the most complex or highest printout regional office requests will need to be processed outside of RO's, except for national or inter-regional requests which will still require centralized processing. Most of the requests shown in Table D-9 require multiple runs, sometimes as many as 25 to satisfy a single request.

IX. General Data Reporting and Handling System Design Specifications

In considering the system design specifications, it must be understood that only the major system requirements can be considered--exceptions must be handled outside the system. There is no possibility of providing an all-encompassing system meeting the requirements of all potential users without incurring costs several orders of magnitude over those resources which may be assumed to be available.

Furthermore, this is an attempt to develop a generalized set of specifications for data reporting and handling--details on design and implementation will be developed by the organization(s) assigned the responsibility for an action plan.

TABLE D-9. CATEGORIES OF DATA USERS

1. EPA RO's (Including S&A, A&HM, Enforcement, etc.)
2. EPA HQ (Program offices only)
3. EPA R&D (Including all ERC's and ORD HQ)
4. State Agencies
5. Local Agencies
6. Other Federal Agencies
7. Private Sector

PERCENT OF TOTAL NATIONAL AIR BANK INFORMATION REQUESTS PROCESSED BY NADB, FY 76*

Requestor	NEDS	SAROAD
Regional Offices	28%	32%
OAQPS, Other EPA, Other Federal Agencies	52%	50%
Private Sector	20%	18%
Total Number of Requests Received:	549	749

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*Numbers of requests processed by RO's or handled by direct access of data files are unknown due to current computer accounting procedures.

Table D-10 provides the general system specifications which must be determined for each user, each data category. These items have been reduced to the form in Table D-11, which can be completed for each data user; the results can then be used to design the specific data handling system to meet the most stringent requirements. Table D-11 now shows, for all user categories, the most stringent system specifications required, as determined in SAMWG deliberations. These specifications will determine the required development or modification of edit updating, maintenance, and retrieval components of the effected systems.

The design specifications have been listed in order that systems can be modified or developed to meet the majority of the requirements of most of the users. The design specifications are self-explanatory and provide the basic information for designing new or modified data systems. A flow chart showing the relationship and responsibilities for data handling is given in Figure D-1.

X. Other Operations

A. State Systems

1. Automatic

States which handle large amounts of data require automatic handling systems. Table D-4 indicates that 25 States have the EPA-developed air quality data handling system and 12 have their own systems. Table D-6 shows that 20 States have the EPA-developed emissions inventory data handling system and 10 have their own systems. A survey in 1975 of the potential for installation of additional data handling systems in State offices provided the information in Table D-12. There is little possibility of additional

TABLE D-10. GENERAL SYSTEM DESIGN SPECIFICATIONS

1. Preferred Originator of Data (from Categories of Data Users)
2. User of Data (from Categories of Data Users)
3. Preferred Data (select one)
    a. Summary Statistics (detailed summary procedures to be specified later)
    b. Comprehensive/Detailed/Raw Observations, also results in summarized data
4. Preferred Data Form
    a. Hard Copy
    b. Machine Readable (must be fixed format), also results in hard copy
5. Preferred Data Use Format
    a. Fixed Format
    b. Optional/Flexible/Non-Specified Format
6. Preferred Storage Responsibility

a.	Local	(multiple locations)
b.	State	(54 locations)
c.	RO's	(10 locations)
d.	HQ	
e.	R&D	

7. Frequency of Reporting - from Preferred Originator of Data to Preferred Storage Responsibility (number of times per year)
8. Time Elapsed - from end of reporting period until user can access data in preferred form/format from preferred storage responsibility (days)

TABLE D-11. USER REQUIREMENTS

Data User: EPA RO's (Including S&A, A&WM, Enforcement)
EPA HQ (Excluding Enforcement and R&D)
EPA R&D
State Agencies
Local Agencies
Other Federal Agencies
Private Sector

System Design Specifications	DATA CATEGORIES						
	Ambient Criteria Information		Ambient Non-Criteria Information	Point & Area Criteria Information	Point & Area Non-Criteria Information	Point Source Monitoring Information	Enforcement and Compliance Information
	NAQTS	SLAMS					
Data Originator	S&L	S&L	R&D	S&L	HQ	S&L	RO
Data User	HQ	S&L	R&D	HQ	HQ	RO	RO
Data: Summary Comprehensive	C	S	C	C	C	C	C
Form: Hard Copy Machine	M	H	M	M	M	H	H
Format: Fixed Non-specified	F	F	F	F	F	NS	F
Storage	HQ	S&L	R&D	HQ	HQ	S&L	RO
Reporting Frequency	Q	As Needed	Q	A	As Needed	As Needed	Q
Time Elapsed	90 days	-	210 days	90 days	-	-	30 days

Q = Quarterly
A = Annually

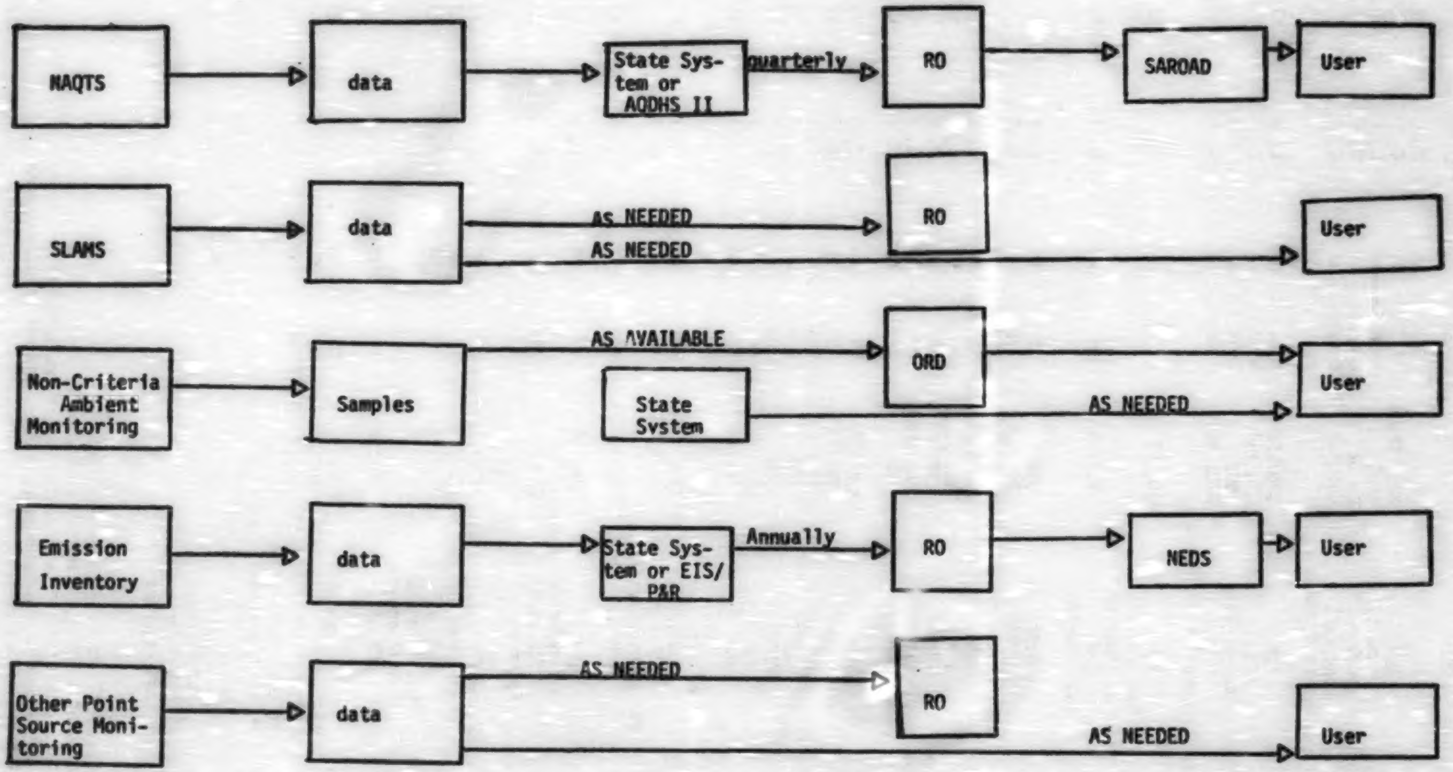
NAQTS
data
State System or AQDHS II
quarterly
RO
SAROAD
User
SLAMS
data
AS NEEDED
RO
AS NEEDED
User
Non-Criteria Ambient Monitoring
Samples
AS AVAILABLE
ORD
User
State System
AS NEEDED
Emission Inventory
data
State System or EIS/P&R
Annually
RO
NEDS
User
Other Point Source Monitoring
data
AS NEEDED
RO
AS NEEDED
User

FIGURE D-1. Flow Chart for Data Handling Responsibilities

TABLE D-12. COMPUTATIONAL FACILITIES AVAILABLE TO STATE AGENCIES

REGION	STATE	MAKE	MODEL	CORE	NO. OF TAPES	COMPILER (1)	USAGE (2)	ADEQUATE TIME E	ADEQUATE TIME A
I	Connecticut	IBM	370/165	3M	NR	C, F	EI, AQ	Y	Y
	Rhode Island	IBM	370/158(4)	NR	4	C, F	. AQ	Y	Y
	Maine	Honeywell	6000	256K	12	C, F	. AQ	Y	Y
	Massachusetts	CDC	CYBER 72	98K words	4	C, F	EI, AQ	Y	Y
	New Hampshire	Honeywell	6066	256K words	11	C, F	. AQ	NR	Y
	Vermont	Not reported						NR	NR
II	Puerto Rico	IBM	370/155	700K	6	C, F	EI, AQ	Y	Y
	New York	IBM	370/155	500K	NR	C, F	EI	Y	NR
		Burroughs	3500	150K	4	(3)	AQ	NR	Y
	New Jersey	IBM	370/145	750K	NR	C, F	AQ	Y	Y
	Virgin Islands	No computer available							
III	Delaware	IBM	360/50	512K	NR	C,	EI	Y	N
	Maryland	Not reported						NR	NR
	Pennsylvania	Not reported						NR	NR
	Virginia	IBM	370/158	2M	NR	C, F	EI, AQ	Y	Y
	W. Virginia	Not reported						NR	NR
IV	Alabama	UNIVAC	1110	NR	NR	C, F	AQ	NR	Y
	Florida	UNIVAC	70	196K	6	C, F	AQ	Y	Y
	Georgia	UNIVAC	1110	262K	8	C, F	. AQ	NR	Y
	Kentucky	IBM	370	NR	NR	C, F	EI, AQ	Y	Y
	Mississippi	IBM	370/155	2M	NR	C, F	EI	Y	Y
	North Carolina	IBM	NR	NR	NR	C, F	EI	Y	NR
	South Carolina	IBM	370/158(4)	2M	12	C, F	EI, AQ	Y	Y
	Tennessee	IBM	NR	NR	NR	C, F	EI, AQ	Y	Y
V	Illinois	IBM	370/165	NR	20	C, F	EI, AQ	Y	Y
	Michigan	IBM	370/155	75K	12	C, F	EI	Y	Y
		CDC	6500	96K	4	C, F	. AQ	Y	Y
	Wisconsin	UNIVAC	9400	64K	2	F	EI, AQ	Y	Y
	Minnesota	CDC	3300	230K	4	C, F	EI, AQ	Y	Y
	Ohio	IBM	370/158	2M	20	C, F	. AQ	Y	Y
	Indiana	IBM	370/165	5M	NR	C, F	EI, AQ	Y	Y
VI	Arkansas	Not reported						NR	NR
	Texas	UNIVAC	1106	262K	6	C, F	EI, AQ	Y	Y
	Oklahoma	IBM	370/145	NR	NR	C, F	AQ	Y	Y
	Louisiana	No computer available						N	N
	New Mexico	IBM	370/158	NR	3	C, F	EI, AQ	Y	Y
VII	Missouri	IBM	370/155	NR	NR	C, F	EI, AQ	Y	Y
	Nebraska	Not reported					EI	Y	NR
	Iowa	IBM	370	86K	4	C, F	EI	Y	Y
	Kansas	Not reported						NR	NR
VIII	Colorado	IBM	370/145	1M	NR	C, F	EI, AQ	Y	Y
	Montana	IBM	370/145	NR	NR	C,	EI	Y	NR
	North Dakota	IBM	370/145	1M	NR	C, F	EI, AQ	Y	Y
	South Dakota	Not reported							
	Utah	Not reported							
	Wyoming	IBM	370/155	NR	NR	C, F	, AQ	NR	Y
IX	Arizona	Honeywell	6000	NR	NR	C, F	EI, AQ	Y	Y
	California	CDC	3300	96K	6	C, F	AQ	Y	Y
	Nevada	UNIVAC	1108(4)	256KW	NR	C, F	AQ	Y	Y
	Hawaii	No computer available						N	N
	Guam	No computer available						N	N
X	Alaska	IBM	370	NR	NR	C, F	EI, AQ	Y	Y
	Idaho	Not reported							
	Oregon	Not reported							
	Washington	Not reported							

(1) C indicates ANSI COBOL compiler available
F indicates ANSI FORTRAN compiler available

(2) EI indicates computer may be used to support the emission inventory
AQ indicates computer may be used to support the air quality system

(3) Does not have ANSI compilers

(4) Computer time is rented commercially

installations, since few States with large numbers of sources/monitors do not already have automatic data handling capabilities; many States are also short of computer capabilities as shown in Table D-12.

Currently the EPA-developed Comprehensive Data Handling System does not have sophisticated editing or retrieval/analysis capabilities, and considerable improvement is required in these two areas. In addition, EPA should continue to support a high level of assistance to State systems users due to their turnover in personnel, technical problems with their equipment facilities, scarcity of resources, and usual system updates, and to assure and maintain compatibility and uniformity in order that the data will be usable and useful.

2. Manual

Some State agencies, due to financial, computer, or manpower shortages, or because of a few monitors and/or sources, must handle data manually. There is a possibility for some activity in this area of providing more efficient manual systems recommendacions or time-saving techniques. However, this may not be a cost-effective effort for EPA, since most of the States operating on a manual basis do submit data in a timely fashion.

B. Clearinghouse Operations

There has been some discussion that a single organization be given the responsibility for collecting and providing information concerning the existence and availability of air pollution associated data. Such a service would provide requestors with information on the originator, location, and perhaps form/format of data. These statistics would include information on special projects, State/local monitoring, source testing and monitoring, and other information not routinely submitted for EPA storage. There is no intention of storing data in the clearinghouse, merely storing information about the data.

At the air monitoring workshops held in January 1977, a general consensus emerged on the potential usefulness of such a clearinghouse and that such an activity would best be operated centrally. EPA's Office of Air Quality Planning and Standards will initiate a study to determine the best and most economical means for establishment and operation of the clearinghouse. Subsequent to this study, operating procedures will be prepared and the initial information base will be collected. The procedures for reporting, collection, storage and dissemination of such information will be provided to all data originators and to all prospective users.

Milestones and an estimated schedule for implementation of the clearinghouse are presented in Table IX-1. The information to be handled by the clearinghouse will include:

1. a listing of SLAMS, updated annually;
2. annual listing of significant special purpose monitoring projects for both criteria and non-criteria pollutants;
3. a listing, provided by industries, of point source monitoring performed (updated annually);
4. information on monitoring methods for the non-criteria pollutants.

The information indicated above should be printed and disseminated on a routine bases to all interested users.